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THE EFFECT OF BILINGUALISM UPON COGNITION

University — Université

THE UNIVERSITY OF ALBERTA

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

MASTER OF EDUCATION

Year this degree conferred — Année d'obtention de ce grade	Name of Supervisor — Nom du directeur de thèse
1979	DR. A. G. SCOTT

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THE EFFECT OF BILINGUALISM UPON COGNITION

by

MARILYN MOSS

(C)

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

AND RESEARCH IN PARTIAL FULFILMENT OF THE

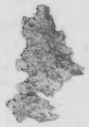
REQUIREMENTS FOR THE DEGREE OF

MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1979



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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "THE EFFECT OF BILINGUALISM UPON COGNITION"

submitted by MARILYN MOSS

in partial fulfilment of the requirements for the degree of Master of Education

in Department of Educational Psychology.

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.....

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Date September 19, 1979

A B S T R A C T

The investigation of the effect of bilingualism upon cognition in children was the purpose of the present study. Review of the literature indicated considerable agreement regarding the strong relationship between language and thought, even though various researchers differed on the nature of this relationship. However, when the issue of bilingualism was studied, the results were much more varied. Early researchers tended to attribute speech, academic, and emotional handicaps to bilingualism. However, more recent studies were careful to take environmental factors into account and achieved much more positive results. Studies revealed improved verbal and non-verbal skills, cognitive flexibility, and creativity among bilinguals who were compared to their monolingual counterparts.

The subjects of the present study were pseudobilingual, that is, they were more competent in their native language than their second language and used their native language for everyday communication. They were grade five and six students at The Edmonton Talmud Torah who had studied Hebrew for half days since kindergarten. Information regarding the subjects' intelligence quotients (as measured by The Lorge-Thorndike Scale) and parental occupations (which were then measured by The Blishen Scale) was obtained from their cumulative records. Proficiency in English was measured using the vocabulary subtest of The Stanford-Binet Intelligence Scale and the writer devised The Moss Hebrew Vocabulary Test to determine fluency in Hebrew. Using results from those two measures the writer calculated an error of estimate for each subject which measured his/her degree of bilingualism. The main hypothesis was that the "more bilingual" the subject, the better the

performance on a test of cognition. The instrument employed to measure cognition was The Portrait Sensitivity Test, a test of facial expression focussing upon participative cognition.

The following variables were correlated using a multiple correlation design: verbal and non-verbal IQ scores, Stanford-Binet vocabulary scores, Moss Hebrew vocabulary scores, cognition scores (Portrait Sensitivity), and degrees of bilingualism. The major finding of the study was that there was a positive, significant correlation between the degree of bilingualism and cognition. Intelligence was ruled out as a contributing factor to performance on the test of cognition. Both the English and Hebrew vocabularies were found to be as appropriate measures of verbal fluency.

ACKNOWLEDGEMENTS

It is with deep appreciation that I acknowledge the interest, advice and support of my thesis advisor, Dr. A. G. Scott. His consistent encouragement and understanding played a large part in the completion of this study. Thanks are also due to Dr. L. L. Stewin and Dr. R. G. Martin who served on the thesis committee and provided thought-provoking questions and helpful suggestions.

I would also like to thank Rabbi J. Toledano, principal of The Edmonton Talmud Torah at the time the research was conducted, the teachers who offered their time and advice, and the grades five and six students who participated as subjects.

Appreciation is extended to Mrs. Debra Poirier who so efficiently completed the typing and preparation of the manuscript.

Final and special thanks are to my husband, Leslie, for his optomism and unflagging support. He was always there when I needed him.

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CHAPTER ONE

INTRODUCTION

The purpose of this study was to determine the effects of bilingualism upon cognition in children. Although research in the area of bilingualism has recently gained in popularity, overall specific literature was sparse. Instead, past research has tended to focus upon investigating the effect of language upon thought (Piaget, 1955; Luria, 1959; Vygotsky, 1962). In almost all cases, researchers supported the finding of language having a positive effect upon cognition although conclusions have varied from the Piagetian idea of language and thought developing concomitantly to the Vygotskian stance of language acting as a precursor to thought. Nevertheless, it has been generally accepted that initially, the infant engages in physical acts which are gradually supplemented and later superseded by language as its usage becomes progressively more abstract. Later, language is utilized for communication, and verbal intercourse with adults assists the child in organizing his own behavior. Luria (1959) stated:

> Language, which incorporates the experience of generations or, more broadly speaking, of mankind, is included in the process of the child's development from the first months of his life. By naming objects, and so defining their connections and relations, the adult creates new forms of reflection of reality in the child, incomparably deeper and more complex than those which he could have formed through individual experience. This whole process of the transmission of knowledge and the formulation of concepts, which is the basic way the adult influences the child, constitutes the central process of the child's intellectual development (p. 11).

Language plays a major role in the development of higher forms of psychological activity such as conceptualization and abstraction and in the more specific tasks of multiplication, seriation and

classification. Lewis (1963) cited the verbal influence as extending to social and ethical development, intelligence and self-awareness.

Research, often following patterns similar to the language-thought studies, began to investigate the effects of two or more languages upon cognition. For the most part, early studies produced negative results. Researchers such as Saer (1923-24), Mitchell (1937), Basso (1945, cited by Jensen, 1962), Stark (1940), and Lewis (1960) all cited negative effects of bilingualism ranging from reduced intellectual functioning to grammatical and articulation difficulties and emotional stress. These studies have since been criticized for neglecting to properly match groups and for not taking into account critical factors such as socio-economic status and attitude of family and community towards the learning of the second language. Prominent early supporters of the benefits of bilingualism (Ronjat, 1913, Leopold, 1948) often studied their own children and were thus well aware of any external factors.

A recognized turning point in the study of bilingualism was that of Lambert's (1962) research regarding the St. Lambert French immersion project in Montreal. Not only did his bilingual subjects display intellectual superiority, but they outscored control groups in various tests of creativity and cognitive ability. Since that time, researchers who have been careful to match groups and control external variables have largely had positive results. Three hypotheses proposed by various theorists have supported the positive effects of bilingualism on cognition. The first, experiential enrichment, stated that the bilingual child is exposed to a wider range of experiences either because the parents compensate for the reduced time with each language (Liedtke and Nelson, 1968) or because exposure to two cultures broadens experience (Peal and Lambert, 1962). The second, the switching hypothesis, proposed

a higher level of cognitive flexibility (Balkan, 1970; Ben Zeev, 1977) or divergent thinking (Carringer, 1974; Landry, 1974) due to the bilingual's attention to the availability of two different linguistic perspectives. The third, the objectification hypothesis supported the idea that bilinguals are better able to separate the object from the work (Ianco-Worrall, 1972). This separation has been well described by Bain (1975):

> The unilingual child is more predisposed to notice objects and events in one particular way. The bilingual child is more predisposed to treating these same objects and events in a variety of ways because of the greater flexibility of linguistic experience. His oscillation between alternate ways of looking at the same things permits him to see the arbitrary nature of any one way of perceiving and facilitates his learning to attend to the thing in itself (p. 10-11).

It was the intent of this thesis to find support for the proposal that bilingualism does have a positive effect on cognition. Most studies conducted to date have involved truly bilingual children, that is, children who have been taught two languages from a very early age. The children in this study, however, knew only English until the time they entered kindergarten. At that point they began to learn Hebrew and studied Hebrew for one half of each school day every year. Thus the subjects of this study were termed pseudo-bilingual, employing O'Doherty's (1958) definition of a pseudo-bilingual as one who knows one language better than the other and does not use the second language in everyday communication.

For the purposes of this study, the effects of this pseudo-bilingualism upon cognition were measured. It was hypothesized that an increased level of bilingualism or fluency in the second language would correlate positively with cognition. In addition, the design included

measuring the influence of intelligence (as determined by I.Q. Score) upon cognition, so that it could be determined if it was increased intelligence rather than increased bilingualism which positively influenced cognition, or if the two were concomitant factors, or if intelligence had no discernible influence. The specific type of cognition measured was participative cognition wherein the subject had to feel or empathize with certain kinds of emotional expressions. When a subject predicts the response of another, Cronbach (1955) stated that "empathy", "social perception" or "social sensitivity" was the process occurring. However, Scroggs (1963) as well as Hall and Cobey (1976) pointed out that participative cognition was not an emotional act but rather a cognitive one wherein the perception of the feeling rather than the feeling per se was of prime importance.

Since these children were not fully bilingual but instead only learned a second language at school, a degree of fluency in the second language rather than an absolute measure of fluency was ascertained. An absolute measure could not be achieved because there was not a normed Hebrew vocabulary test for North American usage available to the writer. Instead, a Hebrew vocabulary test (devised by the writer) and an English vocabulary subtest from The Stanford Binet Intelligence Scale (1972) were administered. From the results of these, a predicted Hebrew score was obtained. By subtracting this predicted score from the actual Hebrew score thereby attaining an error of estimate, a degree of fluency in the second language was found. This error of estimate rather than the subjects' raw Hebrew vocabulary score was used so that the Hebrew vocabulary could be validated as a measure of verbal fluency employing the already recognized Stanford Binet vocabulary. For the purposes

of this thesis, the term "degree of fluency" will be used interchangeably with "degree of bilingualism".

Verbal and non-verbal I.Q. scores were derived from the children's Lorge-Thorndike scores. This test had been administered to all of The Talmud Torah students (on a group basis) by The Edmonton Public School Board. Results of this testing were obtained from the children's cumulative records by the writer.

Finally, the variables of verbal I.Q., non verbal I.Q., Hebrew vocabulary score, English vocabulary score, degree of fluency score and Portrait Sensitivity (or cognitive) score were correlated using a multiple correlation design.

Importance of the Study

At the present time the question of bilingualism in Canada is of prime importance not only to educators but to politicians as well. Research in the area of bilingualism has far outstripped the early linguistic considerations and is presently seen as having important psychological, sociological and educational ramifications.

> At the psychological level there are a number of key issues including such considerations as the effects which speaking or knowing two languages might have on one's intellectual functioning, how belonging to two language communities might affect one's personality and sense of identity, and the effects of bilingualism on one's perception and social interaction with others (Hornby, 1977, p. 9).

Although some important Canadian studies have provided positive results regarding bilingualism (Peal and Lambert, 1962; Liedtke and Nelson, 1968; Scott, 1973; Cummins, 1977) it is clear that there remains a good deal of skepticism regarding bilingualism which can only be dissuaded by further studies indicating positive effects. The reason for needing a supportive environment in which to learn a second language is a

circular one. Firstly, it has been demonstrated that the attitude of the child, family, peers and teachers, all influence how successful second language learning will be (Lambert, 1977; Gardner, Gliksman, and Smythe, 1978). It has also become clear that as people become progressively more bilingual, their attitude towards that cultural group becomes more positive. For example, Lambert (1977) reported that in his 1972 study of English Canadian children studying French, after a few years they became much more sympathetic towards the French and identified to some degree with that culture. However, adopting that second identity need not and does not imply foregoing the first one, which is what many people fear. Instead it means acquiring a duality which can be viewed as a richness.

Although many American and other studies have been cited in this thesis, it is clear that material unique to Canada is of importance. We are officially a bilingual country whereas the United States is not and many of our bilingual issues are quite different. On a cultural level, Canadians have adopted the mosaic pattern (thus valuing and preserving ethnic groups) rather than the American melting pot theory. Finally, socio-economic comparisons to studies from other countries are not always valid.

Another important aspect to this study lies in the fact that much of the previous research has focussed upon the "balanced bilingual" rather than the "pseudo-bilingual". For many educators and parents, total immersion in a second language may seem extreme. However, if they are exposed to research providing positive results supporting even partial (but consistent) second language learning, then perhaps more curriculum time or time in the home can be devoted to such an endeavour.

Finally, such an evaluation of the Hebrew language program in

Edmonton has not been conducted. Hopefully, this facet of the research will aid the administration in evaluating their program.

Limitations of the Study

The numbers of children attending The Edmonton Talmud Torah were comparatively few, thus limiting the sample size. The sample was further restricted by accepting only those children coming from English speaking families who had attended The Talmud Torah since kindergarten and were in grade five or six at the time of testing. Since similar schools were non-existent in the City of Edmonton, comparative studies were also ruled out. Although a pilot study to test the Hebrew vocabulary was administered to students of The Calgary Talmud Torah, there was enough of a discrepancy in the two groups' knowledge of Hebrew to make comparisons invalid. Because the subjects in Calgary knew considerably less Hebrew, it was inappropriate to use their test results to determine the suitability of the Hebrew vocabulary for the Edmonton subjects.

CHAPTER TWO

REVIEW OF THE LITERATURE

The central issue of the present study is that of the effect of bilingualism upon cognition. Therefore, most of the literature review will focus upon studies specific to that issue. However, some background to the area of facial expression will also be provided since the measure of cognition employed related directly to facial expression. Also, prior to delving into the impact that two languages bring to bear upon thought, it is important to consider the question of language development in itself. Language development is an incredibly broad area and the writer has, therefore, chosen to present selected studies relevant to the issue of language and thought which would provide an appropriate introduction to the study of bilingualism.

Language and Thought

Two of the greatest savants who studied the area of language and cognition were Jean Piaget and Lev Vygotsky. Piaget viewed language as a vital part of a child's development process, although he did not deem it prerequisite to other development. He thought that language was important to understand the environment but that the language needed to be grounded in the concrete experience of the prelingual child. The use of symbols then frees the child from the immediate, concrete object and is the first step into representational thought. "For Piaget, language is the vehicle which through its interplay with the earliest forms of thought enables the child to conceptualize the world around him, thus arriving at higher forms of representational thought (Athey, 1971, p. 39)." Piaget (1955) delineated two types of thought; directed or intelligent thought and undirected or autistic thought. In the former,

an aim is pursued and the thought is adapted to reality and tries to influence it. Because directed thought can be communicated, a bond is formed between thought and the use of language. The mid-point between directed and undirected thought occurs when a child's thought is adapted to reality, but he cannot yet communicate it. This is termed egocentric thought.

For Vygotsky (1934), speech and language played an important role in the formation of mental processes. Vygotsky not only found language to be a participant in mental processes such as attention and language, but a precursor to these mental processes. He also viewed language as having a profound effect upon intelligence whereas Piaget thought that intelligence preceded and was independent of speech. According to Vygotsky, a child's mental development begins with communication between himself and an adult. The child then later uses this verbal communication in the organization of his own behavior.

In a child's early stages, Vygotsky attributes more importance to a child's speech than does Piaget.

> Piaget (1971) claimed that young children's verbal messages are neither informative nor communicative because the child does not intend them to be, nor does he possess the linguistic or cognitive skills to make them so. Vygotsky (1962), on the other hand, claims that child speech is essentially communicative, but it is not "social" and, therefore, not informative because the child does not differentiate between himself as listener and the other person as listener. Thus, his messages are directed more to himself than to the listener (Genesee, Tucker and Lambert, 1975, p. 1010).

Carroll (in Bar-Adon and Leopold, 1971) employed Piagetian stages in his discussion of thought and concept development and their relationship to language. He defined concepts as "internal representations of classes or categories of experience (p. 81)" and stated that language

allows the child to learn names for these classes and/or categories. The most common concept developments include causality, mass, weight and volume. Although language can exist without a concept (echoing) and a concept can exist without language (visual discrimination), it is clear that on a meaningful level the two are interchangeable. For instance, socially reinforced words generally have underlying concepts. Further, if children learn a concept verbally in the course of daily living, they would be more likely to have success in a problem situation where the concept is critical and where information must be retained. Because of the complex interractions of our society, the older the person, the more likely that concept development is coupled with verbal learning.

Although an infant does not need expressive language to formulate ideas and concepts, towards the end of the second year of life, the normal child starts an intense use of language to explore relationships with people and things. He/she learns to ask questions and thus seeks help from peers or adults in learning names, categories and the freedoms and sanctions of relationships. Perceptual constancies which the child learned during the pre-verbal stage become really sorted when language has been acquired. The words the child learns gain meaning from his experience (Nielsen, 1969). Therefore, the trend moves from an affective-motivational role to a cognitive one (Carroll, 1971). "Since experience and language so influence our ability to conceptualize, exposure to a wide variety of relevant experiences and encouragement in the acquisition of verbal skills may increase both the quality and quantity of the child's concepts; and may facilitate his application of concepts by providing a more coherent and stable cognitive organization (Siegel, 1964, p. 242)." Language development is normally a good index of a child's general developmental level, and evidence suggests

that thought is improved when one has a ". . . good stock of well learned concepts and their names" (Carroll, 1971, p. 5). This was further supported by Thonis (1977) who stated that the more precise the language of the child, the clearer the thinking.

Carroll (1971) added that language not only enhances conceptual development of children, but that of adults as well:

> The very existence of contrasting words for different categories or for different values of a dimension draws attention to these categories or values, and if a person has to learn to use these words in a way that is acceptable in his speech community, he must of necessity notice and discriminate the corresponding stimuli. The effect of language is thus to make the differences among stimuli more noticeable, or salient, than they would otherwise be (p. 98).

Luria (1959) lent further support to this idea by stating that the word not only indicates a corresponding object in the external world but also abstracts, isolates the necessary signal and generalizes perceived signals and relates them to certain categories. Because the word systematizes direct experience in such a manner, it is exceptionally important in the formation of mental processes. Luria isolated two main functions of the word:

1. Reorganization of perception, that is, the word transfers consciousness from direct sensory perception to generalized rational understanding.
2. The word isolates something and serves as a signal to a particular action. Therefore, words are contained in almost all forms of human activity such as perception, attention, memory, imagination, consciousness and action.

Siegel (1964) supported the intent of the second function by stating that the word facilitates and directs the categorization process by providing tools by which to identify the commonalities. By use of these verbally-

supported schemata, one is free to approach the environment conceptually rather than perceptually or in a sensory manner.

Goldstein and Gelb (1920) were regarded by Luria (1959) as viewing speech as leading to a "higher" thought level:

> The acquisition of speech allowed man to rise above direct visual perception to analysis of its data, to the relationship of perceived objects to certain categories, so enabling him to organize his behavior, not according to the visually perceived situation, but according to a deeper categorized reflection of the world (p. 22).

Pettifor (1968) compared the conceptual development of normal with hard-of-hearing children. Her results indicated ". . . that higher levels of thinking are dependent on the development of language for the organization or ideas or concepts, and that deficiency in language interferes seriously with the development of higher levels of thinking (p. 152)." She therefore also supported the Vygotskian stance of higher level abstract thought being reliant upon language. Abstraction, generalization, and systematization are more difficult for deaf mutes who have somewhat altered perceptual processes.

Language plays a major role in initial learning too. Carroll (1964) described a study conducted by Kurtz and Hovland (1953) in which they directed one group of children to circle on a piece of paper the words that went with a series of objects being shown to them, while another group circled pictures of these objects. One week later, the first group of children were better able to recall or recognize the objects than was the second group. Studies by Lublinskaya (cited by Luria, 1959), Shepard (1963) and Dietze (1963) resulted in similar findings when they employed labelling as a means for learning. Further, Ervin Tripp (1966) cited studies by Bialer (1961), Ruzskaya (1958), Spiker (1963) and Spiker and Norcross (1962) which concluded that the more

distinctive the labels learned for stimuli the more readily are the labels learned and the more quickly are the later motor responses to the stimuli acquired. In fact, Carroll (1971) viewed language as so crucial to learning that he postulated that if someone was not given a label for a concept, he might label it himself in order to facilitate classification. For the child, the learning of verbal processes also enables him to formulate aims and the necessary means for their achievement and to create an imaginative play plan.

Luria (1959) cited three ways in which the participation of speech in mental processes might be studied:

1. Investigation of changes in construction of activity with the development of speech.
2. Investigation of subjects whose brain injuries have led to speech disintegration.
3. Experimental investigation in which speech is either included or excluded in performance of a task.

However, maturational and environmental or social factors overlay speech development and must be taken into account. Considering these factors, Luria developed his famous "twin study" wherein speech development would be artificially rapid and the environment would be constant for the two children.

Luria's subjects were five year old twins who had no mental retardation but whose speech consisted of a few single words and even those were phonetically impaired and tied to concrete situations. They communicated mainly by gestures and relied heavily upon each other. Creative, meaningful play was rare. Other than that, Luria described them as alert, friendly and at age level in self-help skills. Luria's procedure was to put the twins into separate kindergartens and provide

special training for "Twin A" to develop better sound differentiation, pronounciation, and a better developed speech system. The training improved Twin A's speech (and allowed for use of deductions, analogies, abstract comparisons and superior grammar when compared to Twin B), but their separation necessitated communication and that played the greatest role in developing their communication skills. Not only did their speech per se improve, but also their play became constructive and productive with objects taking on permanent rather than just situational significance. All areas of conscious activity were positively influenced by the acquisition of a meaningful language system.

Before attempting to work with the concept of bilingualism, one must be aware of the various definitions of the term and apply the appropriate one to research.

Definitions

Some early definitions of bilingualism included that of Bloomfield's "native-like control over two languages" (1933, p. 259), and Pinter and Arsenian's (1939) simultaneous learning of two languages from birth within an environment wherein the two languages are used interchangeably. Leopold (1939) stated that bilingualism involved learning two languages alternately and eventually concurrently. In his now famous research of his daughter's linguistic development, Leopold defined her bilingualism as having been constantly exposed to two languages, learning to understand and draw active speech from both, using both separately for her everyday communication and eventually reading and writing both. According to him, it did not matter if one language was known better than the other, so long as each was used regularly.

Although bilingualism has been usually taken to mean a second language acquired in the home or school, according to The Encyclopaedia

Britannica (1969), bilingualism can be acquired in a number of contexts: ". . . intermarriage, immigration, trade, colonization, religious conversion, military conquest, travel or residence in a foreign or bilingual community (p. 610)."

Two major types of bilingualism have been delineated: compound bilingualism and coordinate bilingualism.

Compound Bilingualism

Simply, compound bilingualism occurs when the symbols of two languages are used interchangeably with approximately the same meaning. According to McLaughlin (1977),

> Compound bilingualism refers to the case in which both languages serve to express a single meaning and culture. It results from learning a foreign language through vocabulary training in a school situation (i.e. in terms of meanings established by L_1) or from acquiring two languages in a home where both are spoken interchangeably by the same people and in the same situations (p. 439).

Orvik (1976) explained that the compound bilingual does not have a great degree of language independence because for that person the two languages have practically identical meaning systems and therefore give rise to a very similar set of semantic associations.

Coordinate Bilingualism

It is the different context under which it is learned that separates coordinate from compound bilingualism. The languages used by the coordinate bilingual are employed in different situations and express different meanings and cultures. Examples of coordinate bilingualism are when each parent consistently speaks a separate language to the child or when one language is used in the home and the other outside the home (Lambert, Havelka and Crosby, 1958).

Lambert, Havelka and Crosby (1958) suggested that the coordinate

bilingual's experience in distinct spheres would enhance functional separation of the two languages, whereas the compound bilingual's experience in fused contexts would reduce that separation. Therefore, they thought that the coordinate bilingual would exhibit comparatively greater semantic differences between symbols of one language and the other.

Taylor and Simard (1975) elaborated on compound and coordinate bilingualism by relating them to the issue of cross-cultural communications. They proposed that compound bilinguals, who possess unity of language and thought, would encounter few communication difficulties. However, coordinate bilinguals may attribute different meanings to different words in the two languages and therefore might encounter some potential difficulties in cross-cultural interaction.

In discussing compound versus coordinate bilingualism, McLaughlin (1977) cautioned that although there are at least 27 tests for measuring the differences between the two types, the distinction has not been experimentally validated and is difficult to maintain in practice.

Balanced Bilingualism

Recent research in the area of bilingualism has often contained the term "balanced bilingual". However, Hornby (1977) advised that exact situation rarely exists and people are at least slightly more competent in one language than the other. According to him, bilingualism is rarely an all-or-none property, but may exist in degrees ranging from minimal competency to complete mastery of more than one language. Thus, the problem of how to evaluate the degree of bilingualism emerged and was present in this study.

Pseudo-Bilingualism

Persons who are not fully bilingual have been termed by O'Doherty (1958) to be pseudo-bilingual. He defined a pseudo-bilingual as one who knows one language better than the other and does not use the second language in everyday communication. Segalowitz and Gatbonton (1977) emphasized the importance of studying the pseudo-bilingual. They reasoned that the non-fluent bilingual is more prevalent than the fluent bilingual in most parts of the world, and because many studies focus on the effects of second language acquisition (including the present study), those with varying degrees of skill in the second language become ideal subjects.

In any experiment, it is crucial that the definition of bilingualism employed be clearly provided. John and Horner (1971) noted that in some Southwestern American experiments, possessing a Spanish-sounding name qualified one to be a bilingual. Obviously, test results were greatly biased. Also, it is important to note what type of second language instruction is offered in the subjects' school (i.e. total immersion, half day of each language, second language as a subject) and whether that bilingualism implies biculturalism. Another factor is the actual language involved in the study. For instance, the languages can be from totally different linguistic families, from the same family, or even be dialectic variations within the same language.

A final term to be aware of in bilingual studies is "diglossia". It refers to two or more languages being spoken in a given geographical region. Diglossia refers to societies or social groups, whereas bilingualism denotes individuals (Hornby, 1977).

Measurements of Bilingualism

Once the bilingualism has been defined, the next critical issue in

experimental usage is how it will be measured. Macnamara (1967) and John and Horner (1971) agreed closely on categories of tests of bilingualism which commonly have been used to date in the area of general linguistic competence:

1. Language Usage

The aim here is to ascertain what the bilingual does with his language, both expressively and receptively. A common methodology is the questionnaire, the most famous of which was devised by Hoffman in 1934. His scale probed at the languages employed by the child as well as by parents, siblings and others living in the home. The questions pertained to languages spoken, understood, written and read as well as attendance at clubs, movies or plays which might involve a language other than English.

2. Language Proficiency

These tests explored what an individual could do with a language, rather than merely comparing skill of the bilingual versus monolingual counterparts. Various types of tests in this category have been outlined:

(a) Rating scales.

Subjects are asked to rate their proficiency in the two languages. These scales are generally inaccurate because of the subjectivity involved.

(b) Fluency tests.

These tests involve the speed of verbal production or response in the second language. Examples of researchers who have used them include Ervin (1961) who administered tests of picture naming, Lambert (1955, 1959 and 1967), whose tests involved reaction time to pressing appropriate keys and number of French and English words produced in a given time period, and Scherer and Wertheimer (1964,

cited by Macnamara, 1967) whose subjects had to indicate as quickly as possible whether a sentence was true or false. According to Macnamara (1967) the validity of these fluency tests has also been in doubt.

(c) Flexibility tests.

These tests measure more qualitative aspects such as richness of vocabulary. Tests involved tasks such as finding hidden words in a nonsense word or providing synonymous words. An interesting finding by Ervin (1964) was that bilinguals' verbal associations to The Thematic Apperception Test were often significantly different in the two languages. If such differences could somehow be quantified, we would have good insight into a bilingual's verbal competence.

(d) Dominance tests.

These tests measure which of the bilingual's languages is the dominant one. For example, ambiguous words which could belong to either language were presented to the subjects, and the focus was on which language was employed to interpret the word.

(e) Other measures.

These tests involved measuring proficiency in each language compared to monolinguals or other bilinguals, or measuring the amount of interference or dominance.

(f) Some specific measures have been designed to measure Spanish language competence, but these were really applicable only to American bilingual programs for Spanish speaking children. Examples of these tests are the Basic Inventory of Natural Language and the Del Rio Language Screening Test.

In most studies, combinations of the above-mentioned tests have been employed to measure bilingualism. For instance, Lambert, Havelka and Gardner (1959) used a battery involving rating scales and tests of fluency, flexibility and dominance. They found that these measures could be correlated and then interpreted to measure a single factor. In Ben-Zeev's (1977) study, she determined degree of bilingualism via a sentence translation test and a bilingual word association test.

It is crucial to note that the aforementioned methods of measuring bilingualism were devised to set bilinguals apart from monolinguals and to determine which of the subjects could be deemed balanced bilinguals. Obviously the methodology would have to change if all the subjects were pseudo-bilinguals and the issue was who was "more" bilingual. It would appear that in such a situation some comparison between competence in the native and second languages would be necessary. Therefore, although vocabulary has been criticized as a measure of bilingualism (Ben-Zeev, 1977) because of bilinguals' weaker skills in that area, as a comparative measure it provides clear cut and expedient results. It is, however, necessary to devise a vocabulary in each of the two languages because direct translation can often lead to inappropriate (either in terms of commonality of usage or degree of difficulty) words in the second language. Support for this idea in the literature emanated from Sanchez (1965) who evaluated The Stanford Binet Intelligence Scale vocabulary subtest and found it to be unsuitable for direct translation to other languages.

In evaluating bilinguals, tests of intelligence and/or achievement have also been employed. Unfortunately, most intelligence tests are designed for native English speakers with similar cultural background and test scores reflect previous education and achievement. Even if the test is translated, it is restrictive. For example, John and Horner

(1971) noted that a Puerto-Rican version of the WISC has little applicability to Mexican-Americans because many of the words used are uncommon outside of Puerto-Rico. For that very reason, the writer did not construct a direct translation of The Stanford Binet vocabulary into Hebrew. Hickey (1972) suggested use of The Peabody Picture Vocabulary Test in bilingual studies because it does not require a verbal response and yet is widespread in its usage to measure intelligence, achievement and verbal learning ability. Many researchers including Lambert and Macnamara (1969) have suggested The Raven's Progressive Matrices as the best measure of intelligence across linguistic and cultural groups. Using size of vocabulary as a measure of linguistic ability has been criticized because verbalizing and understanding are not differentiated. The writer has circumvented that problem by having the subjects provide definftions rather than just producing as many words as possible.

In achievement testing, the same problem exists of having to use instruments standardized for an English-speaking population.

John and Horner (1971) cited Fishman (1967) as proposing the development of a socio-linguistic model wherein the linguistic, psychological and social aspects of bilingualism could be integrated. That would include analysis of the speech community and the bilinguals' identified behavior, dimensions of social relationships and the interactions within these relationships.

The foregoing information regarding definitions and measurement devices was presented to stress the importance of knowing specifically what type of bilingualism is present and how it will be measured when researching the area of second language learning. In the present study, the subjects were pseudo-bilinguals because they knew English better than Hebrew and English was the language of everyday usage. The Lorge-

Thorndike Scale was employed as a measure of the subjects' intelligence, and English (Stanford Binet Intelligence Scale) and Hebrew (devised by the writer) vocabulary tests measured their proficiency in the respective languages. Because bilinguals were not being compared to monolinguals, it was not important to ensure that tests were equally applicable to both groups.

Bilingualism and Cognition

Since background information and pertinent definitions have been provided, one is able to proceed into the critical research on bilingualism as it relates to thought.

Bain (1975) has summarized the importance of language to our lives in the following manner:

> One piece of the puzzle concerns the recognition of the crucial role of language per se in the transformation of an infant full of promise into an adult with that promise more or less realized. It seems that language is not only a means of expressing one's self, but is, under the circumstances of normal development, the main means of acquiring that very self. From this point of view, language is not seen as just a system of abstract rules of grammar nor just a simple speech response. It is seen as both of these - inextricably interwoven with attitudes, myths, values, images, rituals, and all the fortunate and unfortunate happenings that constitute the life experience of a people (p. 1-2).

Bain proceeded to state that it is through language that a child learns about himself, gains a sense of history and is able to share his world with others. However, language poses restrictions. A language predisposes one to notice certain objects and events and view the world in a particular way. According to Bain, a second language broadens the child's scope and raises his level of knowledge. It is this issue of the impact of an addition of a second language into a child's life that is critical to this study.

In reviewing the literature on bilingualism, a pattern became clear. It appeared that much of the research prior to 1960 stressed the negative effects of bilingualism. Jensen (1962) and Thonis (1977) described the negative side effects of bilingualism found in pre-1960 research. They cited these effects in the areas of speech production, concept acquisition, vocabulary, growth, intellectual power, social adjustment and personality development. For example, Jensen (1962) cited Basso (1945), Blanton and Blanton (1919) and Duncan (1947) as linking speech handicaps directly to bilingualism. Stark's (1940) study of 10 - 12 year old Irish schoolchildren and Lewis' (1960) research of Welsh schoolchildren both indicated superior I.Q.'s of monolingual subjects when compared to their bilingual counterparts. Saer (1923-4) found that monolingual rural schoolchildren and University students were superior in intelligence as well as tests of dexterity. Mitchell (1937) in his study of Spanish speaking children in Arizona, found they were seriously handicapped in their knowledge of English, as evidenced by the fact that they did significantly worse than their English speaking counterparts on English intelligence tests.

Early researchers who cited positive effects of bilingualism commonly studied their own children. The most famous was the work of Leopold (1939) on his daughter, Hildegard. He found that bilingualism provided her with an intellectual advantage because it allowed her to understand content rather than just the form of words. He stated that any phonetic mistakes Hildegard made could have been made by a monolingual child and that there was no sign of bilingual interference. In Ronjat's (1913) study of his son, he found that bilingualism aided in the development of abstract ideas. Four and a half decades ago Bloomfield (1933) observed:

> The apparent frequency with which one meets bilinguals among artists and men of science may indicate a favourable effect of bilingualism on the general development of the child (p. 56).

Nevertheless, the majority of studies were oriented towards the negative. Thus when Lambert and Anisfeld (1962) began what has since become famous research in Montreal they too expected negative results. However, their findings were quite the contrary and their study has been commonly recognized as a turning point in bilingual research.

Before delving into that research and others of the past twenty years, it is important to note criticism which has since been levelled at those earlier studies opposing bilingualism.

Lewis (1960) who himself had results opposing bilingualism indicated that there were a number of variables which had likely influenced his test results:

1. The test he administered was timed and bilinguals are at a disadvantage on timed tests.
2. The groups were not equal with regard to rural-urban differences.
3. Parental occupation was not taken into account.
4. Some "verbal residue" on the nonverbal test may have brought down bilingual scores.

With respect to American studies, McLaughlin (1977) pointed out that the educational handicaps found in bilingual children and attributed to their bilingualism could be more appropriately attributed to poor home environment, inadequate financial resources, poor health and a generalized negative attitude to education. Many of the early American studies involved bilinguals of lower socioeconomic status (immigrants whose second language was English) and even recent studies have failed to take cultural effects into account. For example, in Darcy's (1963) studies

comparing Spanish-English bilinguals with English unilinguals in New York and Welsh bilinguals with monolinguals, she found that the superior performance of the monolinguals did not exist when socioeconomic status was controlled. Anastasi and Cordova (1953) also emphasized the cultural factor and the fact that the type of bilingualism influences test results. Educational opportunity, social background and the degree to which groups were actually monolingual or bilingual were factors cited by Lambert (1977) which had not been accounted for in the early studies. Weinreich (1953) had earlier pointed out that the time of introduction of the second language has often been neglected and it is that timing rather than the second language per se which may cause interference. Other relevant factors noted by Weinreich were: general verbal facility, relative proficiency in each language, ability to keep the two languages apart, prestige of each language and prevailing attitude towards the culture and community. Jensen (1962) stated that the emotional maladjustment previously attributed to bilingualism was more probably due to sources such as poor social status, poor teachers and schools, hostile attitudes of society cloaking deeper racial or religious prejudices and adjusting to two cultures. According to Thonis, (1977) because all of these variables were not properly accounted for, the early researchers were led to ". . . overstate speech difficulties, to describe inaccurately language development delays, to distort intellectual limitations, to emphasize unduly educational retardation, and to magnify without adequate documentation personality disintegration or character disorders (p. 201)."

As noted, the turning point in the research began with the work of Wallace Lambert who has studied bilingualism for about two decades. His most famous work involved the St. Lambert Project (Lambert, Tucker and D'Anglejan (1973)) which involved a French immersion program for

English speaking schoolchildren in Montreal. They ran a pilot study and then did followup studies at various points in the educational process. The children were mainly middle class and of course had parental approval to participate in the program. Lambert provided two models for parental support in the immersion program: instrumental, which relates to practical or economic reasons and integrative, which relates to interpersonal reasons.

A French immersion program is one in which all subjects are taught in French and English is treated merely as a subject. It was assumed that pupils continued to speak English in their home environments. These children were then compared to a group of carefully matched controls who attended a traditional English speaking school and learned English as a subject and to a native French speaking control group. A major evaluation was performed at the end of Grade Four, with the following results:

I. English skills

1. Bilinguals did as well as the controls on English word knowledge, word discrimination and language usage. Both groups were above the 80th percentile when compared to the national average.
2. Reading ability, listening comprehension and knowledge of concepts in English were as good in the bilinguals as in the controls.
3. In telling short English stories the bilinguals did as well as the controls in comprehension, rhythm, intonation, enunciation and overall expression. The bilinguals exhibited a rich vocabulary and complex, spontaneous productions.
4. The ability to decode and use instructions given by English

speakers was as good in the bilinguals as in the controls.

5. The bilinguals exhibited as much maturity, naturalness and spontaneity in word associations as the controls.
6. The bilinguals were faster than the controls in processing English associations.

II. Development of second language skills. The subjects performed as well as French-speaking controls in the following areas:

1. Knowledge of French concepts.
2. Listening comprehension.
3. Mastery of French phonemes leading to a nativelike command when reading.
4. Comprehension of themes, plots or other long, complex verbal content.
5. Rapid, mature and appropriate free associations.
6. Decoding adult descriptions.

The bilinguals did less well than the French controls in knowledge of gender and contraction, oral rhythm intonation and expression, and decoding children's descriptions.

III. The bilinguals did as well as the controls on tests of mathematics.

IV. There was no deficit at all in intellectual functioning or creativity.

V. The bilinguals exhibited a more favourable attitude towards French Canadians although this fluctuated somewhat with the political atmosphere.

VI. The children expressed pleasure with the program, had no desire to drop out and identified both with being French - and English - Canadians.

In general terms, the children in the immersion program exhibited

some cognitive skills not evident in monolingual children. They constantly engaged in contrastive linguistics, that is, they compared and contrasted the two languages in terms of words and linguistic structures. They also displayed linguistic "detective" skills in being very concerned with words, meanings and linguistic regularities. An important skill was that of being able to transfer subjects such as mathematics from the language in which they learned it to the second language.

Bruck, Lambert and Tucker (1973) completed a further followup of the children in the St. Lambert Project at the end of Grade Six. The following were their reported results:

1. The bilinguals exhibited no deficits in English, even in the areas of reading or complex vocabulary. In French they were only slightly less proficient than the monolingual control group in complex vocabulary.
2. The grammar and structure of their French composition was as good as that of the monolingual controls but their vocabulary was less rich. It is possible that they used a more simplistic style in order to avoid errors.
3. The bilinguals did as well as the English controls in mathematics, science and social studies.
4. The bilinguals did as well as both control groups on standardized intelligence tests, and in oral communication of both languages.
5. The bilinguals exceeded both control groups on tasks of cognitive flexibility.
6. The bilinguals identified both with their own ethnic groups and with French Canadians.

The St. Lambert project has had far reaching positive effects for bilingual education in Canada. Evidence that intellectual and

achievement levels were not in any way hampered by a second language program has encouraged many educators and parents to support bilingualism in schools. For example, in Canada The Allenby French immersion program in Toronto and The Elgin County Ontario bilingual project were modelled on the St. Lambert project. In The Elgin County project the curriculum was evenly divided into English and French, according to the time of day and subject (therefore the present study more closely resembles it than St. Lambert). Another program replicating St. Lambert was The Culver City Spanish immersion program in The United States.

Results of The St. Lambert project focussed on a number of areas in which bilingualism purportedly had a positive effect. These findings have been verified by more recent studies. The first of these findings was that bilingualism can accelerate the development of non-verbal and verbal abilities. A study confirming this statement was carried out by Liedtke and Nelson (1968) on Grade Nine children in Edmonton, Alberta. Their purpose was to administer a conceptual task involving judgment of length, measurement and conservation to a group of monolinguals (one language spoken in their homes and they spoke only one language) and a matched group of bilinguals (two languages spoken in their homes and they were bilingual before entering school). The mean score for the bilinguals on the "concepts of linear measurement test" was significantly higher than that of monolinguals. Their scores on the "conservation" and "measurement" parts of the test were also significantly higher. Liedtke and Nelson concluded that

> . . . the linguistic and cultural experience of the bilingual is an advantage. The evidence would seem to demonstrate the importance of social interaction and social environment as ingredients of experience. Intelligence factors necessary for concept formation seem to be developed to a greater extent in the bilingual subject (p. 23).

They further concluded that the bilinguals are likely to reach the concrete operational stage before monolinguals.

Another important local study confirming superior intellectual skills of bilinguals was conducted by Cummins and Gulutsan (1974) on Grade Six students. Their findings from administering The Kuhlmann-Finch Intelligence test were that bilinguals performed significantly better than monolinguals in general reasoning and verbal ability.

Finally, Bain (1974) supported the aforementioned studies in his research wherein subjects had to "discover" rules regarding series of numbers and then "transfer" their learning to further tasks the next day. The bilinguals discovered the rules faster and their total time to discover and transfer was faster than that of their unilingual counterparts. Time required for transferring the rules was the same for both groups.

In the area of non-verbal skills, Hoosain and Atai (1975) conducted a study in Iran comparing the performance of Persian-English bilingual children with Persian monolinguals on visual-motor tasks. On a task of simple tracing there was no difference between the groups. The bilinguals exhibited superior performance in mirror tracing which requires reversed eye-hand coordination. Also, less interference was shown by bilinguals in direct tracing after completing mirror-tracing tasks. The authors attribute the superior performance of the bilinguals to the greater overall flexibility acquired by them in the course of learning two languages. Hoosain and Atai also clarified that the superior performance of the bilingual subjects could be directly attributed to their bilingual experience since ". . no significant correlations were found between number of trials required to learn mirror tracing and any of the socio-economic/school achievement

variables (p. 535-6)." Hoosain and Atai's findings directly disputed an early study by Saer (1923-4) who reported that monolingual children outperformed bilinguals in tests of dexterity.

A second general finding of the St. Lambert project which is of particular interest to the present study is that of bilingualism facilitating cognitive flexibility. Both Ianco-Worrall (1972) in her study of Afrikaans-English bilinguals in Pretoria and Ben-Zeev (1977) in her research on American and Israeli Hebrew-English bilinguals found that bilinguals were able to separate word meaning from sound at a significantly earlier age than their monolingual counterparts. They responded to words semantically rather than phonetically and adapted much more easily to new linguistic rules. Ben-Zeev also reported that superior analysis skills of the bilinguals in the verbal area transferred to non-verbal tasks. For example, on The Raven's Progressive Matrices Task, the bilinguals scanned in a more appropriate manner and displayed clear problem solving strategies (although their actual scores were not higher than the monolinguals). Ben-Zeev concluded that the bilingual children she studied seemed to have developed special facility for seeking out rules and determining which are required by circumstance. In relation to verbal material the bilinguals exhibited a readiness to impute structure and to reorganize and this process operated in non-verbal skills as well. She explained these skills by the fact that bilinguals are confronted with a linguistically complex environment and they have to be able to generalize, form general rules, and use a semantic approach in order to be successful.

Feldman and Shen (1971) had five year olds in a Chicago head start program perform similar tasks to those of Ianco-Worrall's Vygotsky-based tasks involving grasping the idea that names are arbitrarily assigned to

objects and separating objects from their names. They commented that the bilinguals' superior performance indicated that the presence of two language codes facilitates the shift from meaning as word reference to meaning as a function of use. This is a precursor to an adult meaning system and bilinguals reach that level first. Only in the ability to learn nonsense and common names were the monolinguals equal to the bilinguals.

Dahl (1977) also supported the notion of improved cognitive flexibility when he reported that Latin-American bilingual children outperformed their unilingual counterparts on tasks requiring conservation and synthesizing. Schutzengel (1974) also employed Piagetian tasks in her study wherein she reported faster developing concept formation and ability to transfer concepts among her bilingual subjects.

Another cognitive advantage of bilingualism exhibited in the St. Lambert study was that of improved divergent thought. Divergent thought involves expansion from a starting point, as opposed to synthesizing various bits of information in convergent thought. Creativity, imagination and an ability to produce multiple solutions are reflected in divergent thought. Scott (1973), who was a colleague of Peal, Lambert et al tested the children in the French immersion programs specifically for divergent thought and attained significantly higher scores for her bilingual subjects. Both Landry (1970) and Carringer (1974) supported the idea of enhanced creativity among bilinguals. Carringer proposed that cognitive flexibility resulting in increased creativity is developed by the bilingual as a means of coping with language interference. In the aforementioned Cummins and Gulutsan (1974) study, they also tested for divergent thought using Guilford's "Uses" Test (how many uses can one provide for an object) and Kogan's Patterns Test (how many things does a

meaningless drawing represent). On the "uses" test the bilinguals were superior over the monolinguals at the .001 level of significance. On the "patterns" test, the bilinguals achieved superior scores, but these were not significant. Cummins (1977) then proceeded with his own study of Edmonton school children and found that the more "balanced" bilinguals exhibited superior performance on tests of intelligence and divergence. Cummins and Scott agreed that the divergent thinking may be correlated with the ability to learn a second language.

Finally, an area which was discussed within the results of the St. Lambert project and which is particularly critical to the Canadian situation is that of attitude, both towards the learning of a second language and as a result of learning that second language. Obviously, the idea of bilingualism is very important in an officially bilingual country but also, on an unofficial level, Canadians have adopted the mosaic rather than melting pot theory for themselves (Hornby, 1977). That means that not only are there a wide variety of languages and cultures present, but they deserve maintenance. Stereotyping and provincialism are no longer to be valued by our society. Penkala (1978) stated that knowing only one language "puts blinkers on a person" (p. 49), providing a restrictive view of the surrounding world. Therefore, bilingualism can be seen as having positive social and cultural value as has been clearly emphasized by Lambert (1972):

> Of relevance here is the notion that the child brought up bilingually and biculturally will be less likely to have good versus bad contrasts impressed on him when he starts wondering about himself, his own group and others. Instead he will probably be taught something more truthful, although more complex: that differences among national or cultural groups of people are actually not clear-cut and that basic similarities among people are more prominent than differences. The bilingual child in other words may well start life

> with the enormous advantage of having a more open, receptive mind about himself and other people. Furthermore, as he matures, the bilingual has many opportunities to learn, from observing changes in other people's reactions to him, how two-faced and ethnocentric <u>others</u> can be. That is, he is likely to become especially sensitive to and leery of ethnocentrism (p. 230-31).

The other side of the cultural issue is how attitudes affect the learning of the second language. A recurring pattern has been that subjects tend to do well when a positive social value has been attached to learning a second socially relevant and accepted language, without elimination of the native language. This has been referred to by Lambert (1977) as "additive" bilingualism. Conversely, "subtractive" bilingualism usually occurred in situations wherein ethnic minorities were pressured into relinquishing their own language in favor of that of the country to which they have moved. Therefore, the concept of duality has fostered second language learning whereas pressure to give up one's native background has not.

Motivation of the parents and acceptance of the second language in the home have also proven to be powerful factors in the success of the child's second language learning (Gardner, Gliksman and Smythe, 1978). Wanting to learn (or one's child to learn) the second language can be seen in two ways: approach, in which positive aspects to learning the second language are emphasized; and, avoidance, usually resulting from personal dissatisfaction with one's own cultural group (Sodhi, 1970). In the present study, one can assume a relatively high level of parental motivation since the learning of Hebrew is in consonance with the families' culture and there was certainly no external force requiring attendance at that school.

The writer wishes to deal with Bain's (1973) research finally and separately because the present study is based, in part, on his work.

The relevant study was conducted in Edmonton, Alberta with the subjects being 42 balanced bilinguals (average age 11 years 6 months) and 42 English speaking unilinguals (average age 11 years 7 months). They were randomly chosen from their respective Grade Six classes. The Portrait Sensitivity Test was administered to the group. The subjects were required to observe 24 slides of portraits and match each of them with one of five emotional categories provided on a checklist. At a significance level of $p = .003$, the bilingual subjects were better able to identify the emotional expressions. Bain concluded that the more complexly organized language system of the bilingual fostered the ability to select a "right" feeling from a complex of feelings and identify it clearly. His study lends further support to the theory that the bilingual has "greater cognitive plasticity" than the unilingual and may in fact have an overall cognitive advantage over the course of the years.

Facial Expression

Because of the fact that The Portrait Sensitivity Test (1973) was employed as the measure of "cognition" in this study, it was deemed important to provide some background information to this test.

Woodworth (1954) stated that two of the earliest researchers in the area of facial expression were Piderit (1859) and Rudolph (1903). Piderit was a German anatomist who produced simple frontal view line drawings for the judgment of facial expression. These were later used by Buzby (1924, cited by Woodworth, 1954) and Fernberger (1928, cited by Woodworth, 1954) who asked students to provide the most appropriate emotional expression from a list provided. Their subjects did not agree closely, but according to Woodworth, this was due to the fact that outline drawings did not provide adequate information regarding expression. For the same reason,

Ekman, Friesen and Ellsworth (1972) criticized experiments by Langfeld, Guilford, Allport and Feleky (cited by Jenness, 1932), all of whom used line drawings. Many researchers such as Allport (1924, cited by Jenness, 1932) employed the Rudolph pictures, the complete set of which amounted to 680 pictures. Rudolph was a painter who published hundreds of photographs of a male actor.

Following Rudolph, the use of photographs for facial expression experiments became quite popular. Feleky (1914, 1922, cited by Jenness, 1932) produced several hundred photographs of herself and had 100 "reliable persons" judge the emotional expressions therein so that they could be categorized. Ruckmick (1921, cited by Scroggs, 1963) had a female drama student pose for 34 pictures depicting emotion. He had the emotions named by a group of judges and these judgments were used as the correct answers for most studies using Ruckmick's pictures. Gates (1925), in testing children on six pictures from Ruckmick's collection (children aged 3 to 14), found a gradual increase with age in the percentage of approximately correct response. Physical, mental, social and emotional maturity were also contributory factors. She also reported that the expressions ranged from least to most difficult in the following order: laughter, pain, anger, fear, defiance, appeal, scorn, surprise and a blend of sorrow and joy. Frois-Wittman (1930, cited by Scroggs, 1963) devised fifty neutral photographs of himself for use in judging facial expression. These were apparently quite advanced over what had been previously produced.

Bruner and Taguiri (1954, cited by Ekman, Friesen and Ellsworth 1972) criticized the use of still photographs because they do not represent emotion in naturally occurring situations. However, they qualified their criticism by adding that stills would be sufficient

providing that the purpose of the study does not require judgment of sequential behavior.

Ekman, Friesen and Ellsworth (1972) described the work of Dusenbury and Knower (1938), Frijda (1953) and Kozel and Gitter (1968), all of whom successfully used motion pictures in behavior judgment studies.

Live models have been used for studies to some extent, but a number of problems therein have been cited, including difficulty in replication and controlling stimulus input to observers, and presence of extraneous factors such as blushing which may affect an observer's decision.

The next area to consider is that of how these drawings, photographs or motion pictures are used in studies of facial expression. Ekman, Friesen and Ellsworth (1972) succinctly stated that despite some procedural differences, two major types of judgment have been employed:

1. Placing each facial expression into one or sometimes two categories;
2. Rating each face on a series of scales, that is, a dimension task, in which either the expressions can be rated on a scale or the similarity between faces can be rated.

According to Ekman, Friesen and Ellsworth (1972), support for the second approach is based upon the idea that the dimension approach closely relates to how people react to faces in everyday circumstances. In usual social intercourse, the face does not provide enough information to make a category distinction; nor are faces thought of in specific categories. Support for the first approach of course encompasses the opposite stance stating that people do respond to each other's faces in a categorical manner.

A common finding has been that low scores are often achieved when subjects have to label the expression themselves. One reason for this is that the actor may choose one word and the subject a synonymous one,

such as anger vs. rage. Langfield (cited by Jenness, 1932) had five subjects look at 105 Rudolph pictures and name them in their own words. Only 32% of the subjects agreed with the artists' titles. However, when the same pictures were presented with artists' titles, 73% were agreed to by the subjects. Hulin and Katz (1935, cited by Scroggs, 1963) overcame the problem of groping for the right word to describe an emotion by having their subjects sort Frois-Wittman pictures into piles expressing similar emotions.

In 1954, Woodworth developed a scale of emotional expressions which he devised from examining distribution of judgments of a hundred subjects on 86 poses published by Feleky. After some trial and error, he found the following scale to be satisfactory:

I. Love, Happiness, Mirth;

II. Surprise;

III. Fear, Suffering;

IV. Anger, Determination;

V. Disgust; and

VI. Contempt.

From this scale, the correlation between pose and judgment was .92, a much higher accuracy than shown in previous studies.

Schlosberg (1941, cited by Scroggs, 1963) used the Woodworth scale to test 45 subjects on three sets of Frois-Wittman pictures. He had the subjects sort the pictures into six bins for the Woodworth categories and into a seventh bin for mixing. He found the Woodworth scale to hold, but described it as more circular than linear. He had his subjects place the pictures on two nine-point scales: Attention-rejection and pleasant-unpleasantness. By placing results on this axis he could superimpose Woodworth's circular scale on top. He likened the surface to a colour

wheel, with the Woodworth values around the circumference being the hues and the distance from the origin being the intensity.

In 1957, Schlosberg published the "Lightfoot pictures" which consisted of 48 photographs of a female model. These pictures were technically superior to any previously produced and included a sleep-tension variable.

However, the circular model was not widely used and a number of theories continued to produce category scales based upon Woodworth's model. Table I outlines those researchers and the categories they proposed. Although the research spanned approximately 35 years and the investigators had different theoretical viewpoints, the results were fairly consistent. Except for Woodworth, all of the investigators found an interest category, and combined "disgust" and "contempt". However, research by Izard (1971, cited by Ekman, Friesen and Ellsworth (1972) and unpublished work by Ekman, Friesen and Ellsworth suggested that in fact "disgust" and "contempt" may be separable, as Woodworth had originally proposed. Also, Woodworth combined "fear" and "suffering" whereas the others kept "fear" separately and placed sadness-related words in a separate category. It is likely that Woodworth's term "suffering" applied to expressions of sadness or pain or a blend thereof.

Despite support for the category-scale approach, Ekman, Friesen and Ellsworth (1972) pointed out that the researchers all encountered the problem of a blend of emotion in one face:

> If the distribution of responses to a particular face was 60% anger and 40% disgust, the stimulus may well be a blend containing facial components of both these emotions. The confusion may be neither in the face nor with the observers, but in the fact that the investigator gave the observers only a single-response judgment task for a multiple-message stimulus. Some observers reported one response, some the other (p. 63).

TABLE I. EMOTION CATEGORIES PROPOSED BY FIVE INVESTIGATORS

(Ekman, Friesen and Ellsworth, 1972)

Woodworth 1938	Plutchuk 1962	Tomkins & McCarter	Osgood 1966	Frijda 1968 b	Proposed (Ekman, Friesen)
Love Mirth Happiness	Coyness Happiness Joy	Enjoyment Joy	Complacency Quiet Pleasure Joy Glee Worried Laughter	Happy	Happiness
Surprise	Surprise Amazement Astonishment	Surprise Startle	Surprise Amazement Bewilderment Awe	Surprise	Surprise
Fear	Apprehension Fear Terror	Fear Terror	Fear Terror	Fear	Fear
Suffering	Pensiveness Sorrow Grief	Distress Anguish	Despair Boredom Dreamy Sadness Acute Sorrow Despair	Sad	Sadness
Anger Determination	Annoyance Anger Rage	Anger Rage	Sullen Anger Rage Stubbornness Determination	Anger	Anger
Disgust Contempt	Tiresomness Disgust Loathing	Disgust Contempt	Annoyance Disgust Contempt Scorn Loathing	Disgust	Disgust/Contempt
	Attentiveness Expectancy Anticipation	Interest Excitement	Expectancy Interest	Attention	Interest
	Acceptance Incorporation	Shame Humiliation	Pity Distrust Anxiety	Calm Bitter Pride Irony Insecure/ Skepticism	

Although some early researchers such as Bain (1865, cited by Jenness, 1932) thought that identifying emotional expression was innate, the majority found it to be a learned task (Lemoine, Figurin, Allport, cited by Jenness, 1932). Abramovitch (1977) conducted a study of young children's recognition of facial expression. She concluded that it is likely that children first learn about facial expression from their mothers or other family members and then transfer this knowledge to society in general. Therefore, discrimination of cues relevant to familiarity or other social situations likely has more of a learned or cognitive basis than an emotional one. The Portrait Sensitivity Test used in the present study is based on the work of Scroggs (1963) involving his Portrait Judging Test. He claimed that the empathy used in relating to portraits was much less a process of feeling than the ability to perceive feeling. For him, empathy meant "pathetic perception", that is, perception of feeling and emotion. In that way it becomes another perceptual ability and can therefore be quantified and measured.

The process of differentiating emotion or feeling from participation has been succinctly stated by Hall and Cobey (1976):

> In everyday experience, a diversity of feelings arises in commerce with objects within a variety of situations. These objects are seen as having independent status and, in order to deal with them, we must have a sense of what they are. Participation involves the ability to sense and feel the significance of the object as separate from ourselves. For instance, I can participate with a gloomy painting. How different this is from the feelings we have in emotion! . . . In other words, emotional consciousness eventually relates back to the self, while in participatory experience our feelings remain with the object (p. 192-3).

Though participation and emotion both embody feelings, emotion decreases

our self-control and lessens the distance between self and object whereas participation allows one to differentiate between self and object and to articulate the feeling.

Scroggs selected the pictures for his study by examining five thousand reproductions of paintings from the Harvard University Prints catalogue. From these he chose the ones which appeared expressive and which did not have background details or objects held or worn which might precipitate associations. Colour as an affect inducement was eliminated by using only black and white pictures. Using these criteria he narrowed his selection to 57 pictures and administered a pilot study with 17 subjects to sort the pictures into the six emotional categories defined by Woodworth (1954). From those he acquired 25 pictures based on the following specifications:

1. That the picture be as evenly distributed among the six categories as possible.
2. That no picture be included which resulted in a bimodal or apparently random distribution from the pilot group.
3. That no more than one picture in each category which received a modal frequency of more than 80% be included.

Scroggs proceeded on the assumption that the modal response was the correct response and his subjects received one point per correct answer.

Scroggs found that the item difficulty among the portraits varied greatly and randomly. There was a -.06 correlation coefficient between odd and even numbers. The difficulties Scroggs encountered were his limited sample size and the fact that some of the portraits could have fit into any one of a few of Woodworth's categories. Scroggs thought that the Lightfoot photographs would be more reliable than his because the former used the same person, clothing and blank background whereas

Scroggs' were different people and backgrounds and differing painting styles. Also, it is possible that some of the subjects recognized the paintings and may therefore have known what the artists intended. Finally, Scroggs recommended that the subjects should be tested simultaneously under identical conditions and that to facilitate this the picture should be projected onto a screen.

Bain (1973) replicated Scroggs' Portrait Judging Test almost exactly, naming it The Portrait Sensitivity Test. He took Scroggs' advice and had the portraits mounted on individual film slides so that they could be shown to all of the subjects simultaneously on a screen. He also conducted another norming study to check the reliability of Scroggs' findings. Bain used only five categories, omitting "disgust" because he found that the two portraits supposedly in this category were not sufficiently discriminating. When administering the test, Bain had each of the subjects work independently and no time criteria were set. In order to record answers, each subject was given a checklist with the five emotional categories listed on the horizontal and 24 blank spaces on the vertical. Bain employed The Portrait Sensitivity Test in his studies of bilingual schoolchildren.

Support for use of The Portrait Sensitivity Test (or any test of facial expression) in a study of bilingualism was provided by Ekman, Friesen and Ellsworth (1972). They found that the same emotions for the same facial expressions were judged by observers from fourteen different cultures or nations in experiments which had many different stimuli and many different stimulus persons. Conclusive evidence of a "pan-cultural" element in facial behavior was thus found.

CHAPTER THREE

DESIGN OF THE STUDY

The primary purpose of the study was to determine effect of bilingualism upon cognition. More specifically, the subject's knowledge of English and Hebrew (as measured by expressive vocabularies in these respective languages) was to be compared, as it was hypothesized that the more fluent the subject was in the second language (Hebrew), the more successfully he would perform on a test of participative cognition. The influence of intelligence upon both fluency in the languages and participative cognition was also measured. All of these factors, that is: verbal and non-verbal intelligence, English vocabulary score, Hebrew vocabulary score, degree of fluency score, and participative cognition score were correlated and a significance level of $p = < .05$ was employed.

All testing took place in Edmonton, Alberta, during April, 1974.

Subjects

The subjects were 38 grade five and six students of whom 22 were males, 16 were females and whose average was 11.30 years. They attended The Edmonton Talmud Torah, a Hebrew parochial school which offers nursery, kindergarten and full day classes up to the grade 6 level. One half of the daily academic instruction is presented in Hebrew. Concurrent with actual Hebrew language instruction the students are taught Bible, History and Current Affairs in Hebrew.

It was desirable to test students in the senior grades so that they had had maximum exposure to the second language and would resemble Bain's (1973) subjects in age. Also, by the senior elementary level, two factors were relevant: the first was that any initial interference resulting from learning the second language would likely have been overcome by then; secondly, children at that age are more dependent upon

language in their learning and it was therefore more appropriate to conduct a verbally-based study. In 1977, Cummins put forth the threshold theory of second language acquisition, stating that a certain level of competence in the second language must be achieved before cognitive benefits can be reaped. This threshold can not be measured (it is dependent upon amount of time spent with L_2 and the type of cognitive operations that must be expressed through L_2), but by the senior elementary grades one assumed that to a large extent, it had been reached.

The grade five class was included in order to increase the size of the sample. Since the sample size was already small, the numbers of male and female students were not equalized. All students in the two grades were included in the sample, providing they met the following criteria:

(1) They had to be present at all testing sessions.

(2) They must have attended The Edmonton Talmud Torah from the kindergarten level up until their present grade of five or six. Having subjects with identical educational background was supported by Lambert (1972) in his list of factors needing to be controlled in bilingual studies.

(3) They should not have had Hebrew spoken to them in their homes, nor in any way should they have learned extra Hebrew, such as through visiting Israel. In this way the subject's knowledge of Hebrew was not increased by extraneous factors, and the homogeneity of the sample in terms of their exposure to the second language was maintained. A similar control was placed upon a sample by Cooper (1958) in his study of fifth graders in Guam. They learned English only in the classroom and spoke their native Shamorros on the playground and at home.

Seventeen subjects were excluded from the study for not meeting the selection criteria.

The subjects were further described in terms of their families' socio-economic status, as measured by the Blishen occupational class scale. This scale (Blishen, 1958, 1961) classifies 343 occupations and places them on a seven point continuum, with a score of one being the highest and seven being the lowest. The Blishen scores of the subjects ranged from one to six, with an average score of 2.2. The standard deviation was 1.49 and 31 of the 38 subjects, or 82 percent fell within plus or minus one standard deviation from the mean. It was therefore concluded that the majority of the subjects were within an upper middle class socio-economic standing. According to studies by Carroll (1971), Jones (1960) and McCarthy (1954), linguistic development of such children would be faster than that of children from lower socio-economic standings. Table II provides a summary of the parental occupations of the subjects (father's occupation, unless he was absent from the family, was that which was provided on the cumulative records) and the frequencies of each.

Instruments

The instruments used in this study were: The Lorge-Thorndike Scale, The Vocabulary subtest of The Stanford Binet Intelligence Scale (Form L-M), the Moss Hebrew Vocabulary Test, and the Portrait Sensitivity Test.

The Lorge-Thorndike Scale is a group intelligence test which, although less dependable than individual I.Q. tests, is frequently used because of time contraints. In his study of Italian bilingual children, Hill (1936) reported that group intelligence tests were strong predictors of individual I.Q.'s for the subjects in his sample. According to Lambert, Tucker and D'Anglejan (1973), the Lorge-Thorndike Verbal Battery

TABLE II

OCCUPATIONS OF THE SUBJECTS' PARENTS

Occupation	Frequency	Blishen Score
Lawyer	6	1
Doctor	5	1
Self-Employed	3	2
Business Man	2	2
Manager/Bowling Alley	2	2
Car Dealer	2	5
Insurance Salesman	2	2
Dentist	1	1
Assistant Manager	1	2
Hair Dresser	1	6
Caterer	1	5
Life Underwriter	1	2
Druggist	1	2
Merchant	1	2
Feed Lot Manager	1	5
Business Manager	1	2
Teacher	1	2
Administrative Officer	1	2
Radio Announcer	1	3
Engineer	1	1
Wholesaler	1	2
Baker	1	6
Product Planning Assistant	1	2
	38	

measures intelligence as well as a measure of basic understanding of the English language. The Lorge-Thorndike had been administered to all of the Talmud Torah students by psychologists from the Edmonton Public School Board. The results of this testing were obtained from the subjects' cumulative records and were used by the writer to describe the subjects' verbal and non-verbal intelligence quotients.

The vocabulary subtest of the Stanford Binet Intelligence Scale (Form L-M) was administered in order to measure proficiency in verbal word definitions. Use of this subtest to measure fluency in English was supported by Sattler (1974) in an analysis of functions and processes of the Stanford-Binet wherein he cited language as the major factor measured by the vocabulary subtest. Employing this subtest to measure ability to define words was cited by Ferinden, Jacobson and Kovalinsky (1970) who stated that at the intermediate level (that is, approximately the 10 to 12 year level), the vocabulary subtest involves ". . . the correct use of words in association with concrete and abstract material . . . (p. 27)." The vocabulary subtest is listed in Appendix A.

The Moss Hebrew Vocabulary was prepared by the writer. A normed Hebrew Vocabulary test similar to that of the Stanford-Binet had not been yet developed for North American usage. Although there are normed vocabulary tests in Israel, using them would have been difficult because of differences between words which are taught early to children there and in Canada. For example, the word "evening" in Hebrew is well known to very young children, whereas it would not be considered one of the more simple words in an English vocabulary. Also, cultural differences make an Israeli vocabulary not totally functional in Canada. For instance, words pertaining to weather, food and holidays would provide large differences between what is common to an Israeli child and his/her

Canadian counterpart. For similar reasons, Hill (1936) devised his own test of Italian word meaning prepared to measure word comprehension. He used that test for his study of Italian-English bilinguals. Also, Sanchez (1965) criticized direct translation of The Stanford-Binet vocabulary because of its inappropriateness to other linguistic situations.

The choice of words was made by choosing frequently used words in Talmud Torah textbooks from the kindergarten to grade nine level. The writer also employed a word list she had from an immersion Hebrew language course taken in Israel. Some suggestions for words at the more adult level were derived from the principal and the writer's own knowledge of Hebrew.

Acceptable definitions for the words were derived from the Hebrew dictionaries and textbooks used at The Talmud Torah. Words were scored by correct definition, as well as appropriate usage within a sentence. For example, acceptable definitions of the word "pen" include "something to write with, has ink in it, use it in school to write on paper". Also, a sentence such as "In school we now write with pens instead of pencils" would also be credited. Unrelated definitions such as "A thing to use" or unclear sentences such as "my father has a pen" would not be scored as correct.

Considerable assistance in choosing words and acceptable definitions was obtained from the school's principal. Three teachers of Hebrew then reviewed the completed list and made suggestions for change. All four of these people taught Hebrew and were fully bilingual. The teachers were asked whether the words on the list were representative of key words at the various age levels and to rank them in order of difficulty. Although complete concensus was not reached among them, the writer kept

words upon which they all agreed, and omitted words which they all felt to be inappropriate. However, the writer still had no way of clearly validating the order of the words although there was sufficient certainty that the words generally increased in difficulty. To counteract this problem (and that of oral presentation) all of the words were administered to the subjects. The completed vocabulary list consisted of 70 words. The vocabulary list, as well as a translation thereof. is included in Appendix B.

The Portrait Sensitivity Test was used to measure cognition. specifically participative cognition. An earlier version of this measure was designed by Woodworth in 1938. He developed the scale by examining the distribution of judgments of 100 subjects on 86 photographs published by Feleky (1922). The subjects were to identify what emotion they thought the photographs were portraying. Woodworth then minimized their errors by classifying nearly alike emotional descriptions into distinct categories. The six categories he employed were:

(1) Love, happiness, mirth;

(2) Surprise;

(3) Fear, suffering;

(4) Anger, determination;

(5) Disgust; and

(6) Contempt.

Using this scale on adult subjects, a correlation of 0.92 was found between pose and judgments and equally high correlations were found when other sets of photographs were used. This was a much higher accuracy than had been obtained in previous studies (Langfield, 1918; Allport, 1924) which did not provide such categories, but instead had their subjects label the emotions randomly. Woodworth's scale was used again success-

fully by Schlosberg in 1941.

This particular measure (others were used in the interim), was then modified by Scroggs (1963). He selected 25 reproductions of portrait paintings from an original selection of 5,000 and these were distributed as evenly as possible among the six categories. He then had 150 subjects attempt to categorize the 25 photographs. He felt that their sample size was too small for good validity and that the standard deviation of 2.28 was too small for good discrimination. Scroggs recommended that the sample should be tested simultaneously under identical conditions and the pictures should be projected onto a screen. These recommendations were employed by Bain (1973) and the writer in their studies.

In research by Bain (1973), comparing English unilinguals to French-English bilinguals, the category of "disgust" was omitted because the two portraits previously reported to be in this category were not found to be sufficiently discriminating. The Portrait Sensitivity Test produced statistically significant ($p \leq .05$) differences between all of the younger age groups tested (7-8; 9-10; 11-12) and the adult group. Among the younger groups, the scores increased with age, but the differences were not statistically significant. Bain concluded that the participative cognition measured by this test increased with age. In another study comparing 10 to 11 year old unilinguals and bilinguals, Bain (1973) reported significant superior performance on a test involving logical operations ($p = .003$) by the bilingual subjects.

The portraits used consisted of 24 black and white reproductions painted by masters such as Dürer, Hals, and Rembrandt. They were mounted on individual film slides for projection onto a screen. The test requires that the subject be able to identify an emotional expression represented by each portrait and label it as such. Each portrait portrays one of the

following five emotions: love, surprise, contempt, fear or anger. The emotions depicted by each picture have been classified by artists' and critics' reports as expressing one of the five above mentioned emotions. The list of the portraits with the correct emotional category, and the answer sheet are provided in Appendix C.

Experimental Procedures

The subjects were tested as a group over four testing sessions. The Portrait Sensitivity Test was administered in the first session, the English vocabulary in the second and the Hebrew vocabulary in the final two sessions. Two teachers were present to aid in monitoring behaviour, but all of the subjects' questions or comments had to be directed towards the experimenter.

The Portrait Sensitivity Test was the first of the tests to be administered. Three preliminary slides were shown in order that the subjects could gain familiarity with the test and ask questions if needed. Each subject was given a checklist with the portraits numbered vertically and the five emotions placed horizontally. There was space to check off the appropriate emotion for each portrait. The instructions (Bain, 1973) were given as follows:

> Do you see this (preliminary slide) face on the screen? I want you to tell me how you would feel if you felt the way this face feels. If you would feel love, then check off love on the sheet provided. Try to do each one as fast as you can. The first feeling you get is the one I want you to put down (p. 13).

The instructions were repeated as required, and the emotions were defined by using parts of the definitions in Webster's New Collegiate Dictionary (1959) as follows:

> (1) Love — A feeling of strong personal attachment induced by sympathetic

understanding or by ties of kinship; ardent affection . . . strong liking, fondness, good will . . . (p. 498).

(2) Surprise -- To seize by attacking unexpectedly . . . to strike with amazement because unexpected or different from that anticipated . . . emotion excited by what is sudden and unexpected; astonishment. (p. 854).

(3) Contempt -- Act of contemning; the feeling with which one regards that which is esteemed mean, vile or worthless; scorn . . . (p. 180).

(4) Fear -- Painful emotion marked by alarm, dread, disquiet . . . state or habit of fearing . . . (V.I.) to be afraid . . . (p. 302).

(5) Anger -- Trouble, affliction . . . a passion or emotion of displeasure, and usually antagonism, excited by a sense of injury and insult . . . (p. 34).

The definitions were read out as requested by individual students. Time limits were not set and the subjects worked independently.

The vocabulary subtest of the Stanford-Binet Intelligence Scale was administered orally and each subject was provided with blank lined paper upon which to write the definitions. The directions given by the examiner were:

> I am going to dictate a list of words. For each word you are to write down a definition or meaning. Your answers do not have to be in full sentences, but make them as complete as possible. You may use the word in a sentence, if you think that will help make the meaning more clear.

The words were read out singly and no time limits were imposed. Words were repeated upon request, but were not spelled. This administration varies from standard procedure for the vocabulary subtest which requires an oral definition from the subject that is subsequently written down by

the examiner. Having the subjects write their answers facilitated administering this test to a group. The scoring criteria of the Stanford-Binet specified discontinuing the testing after six consecutive failures. However, in group administration, it was impossible to know when all of the subjects had reached this point. Therefore the entire vocabulary subtest was given so that there would not be any subjects having to stop before they failed six or more words.

The Moss Hebrew Vocabulary was administered over two sessions, one week apart, in order to avoid undue fatigue. Thirty-two words were given during the first session, and thirty-eight words were given during the second session, with the following instructions:

> I am going to dictate some Hebrew words in the same way that I gave you the English words last week. Again I want you to write down the best definition you can and your answer must be in Hebrew. Writing an English meaning for the word will not be scored as being correct. You may use the word in a sentence, and there will not be any penalty for spelling or grammar mistakes.

In an identical fashion to the administration of the English vocabulary, the subjects were given blank lined paper on which to respond, words were repeated if necessary, and there were no time restrictions.

Statistical Analysis

The English vocabulary was scored according to the scoring criteria of the Stanford-Binet Intelligence Scale and a raw score, according to the number of correct responses, was obtained for each subject. Due to the fact that the Hebrew vocabulary did not have a standardized scoring system, an absolute measure of fluency could not be determined from that test. Therefore, from the score attained on the English vocabulary, a predicted Hebrew score was obtained for each subject. A prediction formula (Glass and Stanley, 1970) for estimating a dependent variable

from an independent variable, was used for this purpose. Glass and Stanley cited this method as being particularly useful for estimating an individual's score from an already known score. Once a predicted score for each subject was ascertained, this score was then subtracted from the subject's actual Hebrew score, yielding an error of estimate, or more specifically, an indication of Hebrew fluency. Degree of fluency, and degree of bilingualism, are terms which have been used interchangeably in describing what has been measured by the error of estimate. All subjects whose error of estimate was above zero were more proficient in Hebrew than expected by the predicted score and those whose error of estimate was below zero were less proficient. It was this degree of fluency in the second language which was taken to be the most significant entity to correlate with the subject's level of cognition.

Six variables were obtained on each subject. These consisted of:

(1) Standardized verbal I.Q. score on the Lorge-Thorndike.

(2) Standardized non-verbal I.Q. score on the Lorge-Thorndike.

(3) Raw score on the vocabulary subtest of the Stanford-Binet Intelligence Scale. Words were scored as either being correct (1 point) or incorrect (0 score), meaning that 45 was the maximum possible score.

(4) Total score on the Moss Hebrew Vocabulary Test (out of a possible 70).

(5) Total score on the Portrait Sensitivity Test (out of a possible 24).

(6) Degree of bilingualism score as measured by the error of estimate.

The above listed variables were employed in testing the hypotheses for this study. The two major hypotheses of the study were:

Hypothesis I

The subjects' degree of bilingualism will correlate positively with the level of participative cognition as measured by The Portrait

Sensitivity Test. This hypothesis is the most significant in determining the possible effects of bilingualism upon participative cognition in children.

Hypothesis II

The Lorge-Thorndike I.Q. scores will correlate positively with those of The Portrait Sensitivity Test.

In addition, five supplementary hypotheses were stated to determine the effects of the other variables upon each other. Since vocabulary plays such a significant role in measuring verbal intelligence (Cole, 1948), it was assumed that verbal I.Q. and English vocabulary would be positively correlated. Similarly, verbal I.Q. and the Hebrew vocabulary would correlate significantly, because despite the shift in language, similar linguistic and conceptual skills are required for the Hebrew vocabulary.

The five supplementary hypotheses are stated below:

Hypothesis III

The subjects' verbal I.Q. scores, as measured by the Lorge-Thorndike will positively correlate with the scores on the vocabulary subtest of the Stanford-Binet Intelligence Scale.

Hypothesis IV

The subjects' Lorge-Thorndike verbal I.Q. scores will correlate positively with their scores on the Moss Hebrew Vocabulary Test.

Hypothesis V

The Portrait Sensitivity Test results will correlate positively with those of the vocabulary subtest of the Stanford-Binet Intelligence Scale.

Hypothesis VI

Scores on The Portrait Sensitivity Test will correlate positively

with scores on the Moss Hebrew Vocabulary Test.

Hypothesis VII

A positive correlation will be obtained between verbal I.Q. and the degree of bilingualism.

CHAPTER IV

RESULTS

In order to arrive at conclusions regarding the postulated hypotheses, it was first necessary to obtain results for each subject on each of the six variables. Restated, the variables were as follows:

(1) Standardized verbal I.Q. score on The Lorge-Thorndike.

(2) Standardized non-verbal I.Q. score on The Lorge-Thorndike.

(3) Raw score on the vocabulary subtest of The Stanford-Binet (Form L-M) Intelligence Scale.

(4) Total score on the Moss Hebrew Vocabulary Test.

(5) Total score on The Portrait Sensitivity Test.

(6) Degree of bilingualism score as measured by the error of estimate.

Scores on The Lorge-Thorndike Intelligence Test (verbal and non-verbal), which was administered to the subjects through The Edmonton Public School Board, can be found in Appendix D. The mean verbal I.Q. score of the 38 subjects was 111.6 and the mean non-verbal I.Q. score was 112.8.

The vocabulary subtest of The Stanford-Binet Intelligence Scale was scored according to acceptable definitions outlined in the test manual (1972). Because it is normally an oral test, errors in grammar or spelling were not penalized. Raw scores obtained by the subjects on this test are found in Appendix E.

Acceptable definitions for The Moss Hebrew Vocabulary Test were obtained from a Hebrew dictionary and from discussion by the writer with the principal of The Edmonton Talmud Torah. The entire test was administered and each correct definition received one point regardless of how many errors may have preceded it. The raw scores, which are out of a possible 70 correct, are in Appendix F.

Responses to The Portrait Sensitivity Test were scored according to the emotional categories in Appendix C and the subjects' total scores, out of a possible 24, are available in Appendix G. The scoring criteria used were identical to those employed by Bain (1973) in his use of The Portrait Sensitivity Test.

The first statistical procedure entailed predicting a Hebrew score and then subtracting that predicted score from the observed score in order to arrive at an error of estimate. These errors of estimate represent the degree of fluency in Hebrew or the degree of bilingualism of each subject and are provided in Table III. A positive number means that the subject's Hebrew score was greater than had been predicted, the higher positive numbers indicating greater proficiency. A negative number means the subject's performance in Hebrew was worse than predicted, with the greater negative numbers indicating lesser abilities.

The six variables, verbal I.Q., non-verbal I.Q., English vocabulary score, Hebrew vocabulary score, Portrait Sensitivity Test score and degree of bilingualism were then correlated using the Pearson product-moment correlation. In correlating I.Q., socioeconomic status and intelligence, Pinter and Arsenian (1937) had also employed the Pearson product-moment correlation coefficient. The resulting correlations matrix is presented in Table IV.

The significance of the correlation coefficients was determined by using a one-tailed t test, which was chosen because directionality was being predicted. The level of significance chosen was $p \leq .05$ therefore making 0.257 the critical value for a one-tailed t test.

For purposes of clarity, the hypotheses are restated and discussed in terms of pertinent statistical data.

Table III

Degree of Bilingualism Scores
As Measured by Error of Estimate

Subject	Predicted Score	Actual Score	Degree of Bilingualism
01	37.3	41	3.7
02	29.2	14	-15.2
03	40.0	40	0.0
04	25.1	15	-10.1
05	22.4	34	11.6
06	29.2	33	3.8
07	30.5	04	-26.5
08	22.4	01	-21.4
09	26.4	23	- 3.4
10	23.7	23	- 0.7
11	29.2	06	-23.2
12	26.4	33	6.6
13	30.5	36	5.5
14	29.2	43	13.8
15	29.2	26	- 3.2
16	25.1	26	0.9
17	25.1	39	13.9
18	26.4	07	-19.4
19	26.4	34	7.6
20	29.2	37	7.8
21	35.9	41	5.1
22	40.0	46	6.0
23	40.0	41	1.0
24	29.2	44	14.8
25	34.6	42	7.4
26	34.6	28	- 6.6
27	33.2	48	14.8
28	38.6	55	16.4
29	25.1	24	- 1.1
30	26.4	39	12.6
31	38.6	16	-22.6
32	35.9	40	4.1
33	35.9	27	- 8.9
34	38.6	35	- 3.6
35	40.0	32	- 8.0
36	31.9	39	7.1
37	34.6	37	2.4
38	22.4	29	6.6

Table IV

Correlation Matrix

Column	1 (Verbal I.Q.)	2 (Non-Verbal I.Q.)	3 (S-B Vocab)	4 (Moss Vocab)	5 (Port. Sens)	6 (Degree of Bilingualism)
Row 1	1.000	0.699	0.448	0.487	0.204	0.322
Row 2		1.000	0.346	0.291	0.021	0.154
Row 3			1.000	0.439	0.149	-0.001
Row 4				1.000	0.426	0.898
Row 5					1.000	0.401
Row 6						1.000

The probabilities of the t values are reported in Table 5 below:

Table V

Probabilities of t

Column	1	2	3	4	5	6
Row 1	0.0	0.000	0.005	0.002	0.219	0.048
Row 2		0.0	0.033	0.077	0.900	0.357
Row 3			0.0	0.006	0.372	0.995
Row 4				0.0	0.008	0.000
Row 5					0.0	0.013
Row 6						0.0

Hypothesis I

The subjects' degree of bilingualism will correlate positively with the level of participative cognition as measured by The Portrait Sensitivity Test.

Correlation Between Portrait Sensitivity Test Score and Degree of Bilingualism

N = 38	r = .401	p = .013

Hypothesis I was therefore confirmed. Within this test sample of pseudo-bilinguals, those who were comparatively more proficient in Hebrew were also more successful on a test of participative cognition, lending support to studies noted in the review of the literature (e.g. Peal and Lambert, 1962; Feldman and Shen, 1971; Ianco-Worrall, 1972; Bain, 1974) which reported positive correlations between bilingualism and cognition.

Hypothesis II

The Lorge-Thorndike I.Q. scores will correlate positively with those of The Portrait Sensitivity Test.

Correlation Between Lorge-Thorndike Verbal I.Q. and Portrait Sensitivity Score

N = 38	r = .204	p = .219

Correlation Between Lorge-Thorndike Non-Verbal I.Q. and Portrait Sensitivity Score

N = 38	r = .021	p = .900

Neither the correlation between the Verbal I.Q. and Portrait Sensitivity score nor the correlation between the Non-verbal I.Q. and the Portrait Sensitivity score were significant. This finding is critical

because it rules out intelligence as the main factor affecting participative cognition, leaving bilingualism as the significant variable of those measured in this study.

Hypothesis III

The subjects' Verbal I.Q. scores as measured by The Lorge-Thorndike will positively correlate with their scores on the vocabulary subtest of The Stanford-Binet Intelligence Scale.

Correlation Between Lorge-Thorndike Verbal I.Q. and The Vocabulary (Stanford-Binet Intelligence Scale) Score

N = 38	r = .448	p = .005

Hypothesis III was confirmed, thus validating the close link between vocabulary and intelligence and supporting use of the Stanford-Binet vocabulary as a good indicator of the subjects' verbal skill level in English.

Hypothesis IV

The subjects' Lorge-Thorndike Verbal I.Q. scores will correlate positively with their scores on The Moss Hebrew Vocabulary Test.

N = 38	r = .487	p = .002

The correlation between the Hebrew vocabulary and the Verbal I.Q. is of even greater significance than that between the English vocabulary and Verbal I.Q., supporting the use of The Moss Hebrew Vocabulary test as a measure of verbal fluency in that language.

Hypothesis V

The Portrait Sensitivity Test results will correlate positively with those of the vocabulary subtest of The Stanford-Binet Intelligence Scale.

Correlation Between The Portrait Sensitivity
Test and The Vocabulary Subtest of
The Stanford-Binet Intelligence Scale

N = 38	r = .149	p = .372

A significant positive correlation was not obtained for this hypothesis. The results suggests that verbal fluency in the English language is not a major contributing factor to participative cognition, and vice-versa.

Hypothesis VI

Scores on The Portrait Sensitivity Test will correlate positively with scores on The Moss Hebrew Vocabulary Test.

Correlation Between The Portrait Sensitivity
Test and The Moss Hebrew Vocabulary Test

N = 38	r = .426	p = .008

This hypothesis was confirmed and was interpreted in light of knowledge of two languages (rather than merely fluency in the Hebrew language) improving cognition.

Hypothesis VII

A positive correlation will be obtained between Verbal I.Q. and the degree of bilingualism.

Correlation Between Verbal I.Q. and
The Degree of Bilingualism

N = 38	r = .322	p = .048

Hypothesis VII was supported clearly because of the vocabularies' central role in the degree of bilingualism and significant correlation with Verbal I.Q.

To summarize the aforementioned findings, a significant positive correlation was obtained between the subjects' degree of bilingualism and their scores on The Portrait Sensitivity Test. It can therefore be concluded that the degree of bilingualism is positively correlated with participative cognition, without general intelligence being a significant contributory factor.

Of the five supplementary hypotheses, four were confirmed and one was not. The Verbal I.Q. correlated positively and significantly with the English vocabulary (vocabulary subtest of The Stanford-Binet Intelligence Scale), the Hebrew vocabulary (The Moss Hebrew Vocabulary Test) and with the degree of bilingualism. Although participative cognition scores (The Portrait Sensitivity Test) did correlate significantly with Hebrew vocabulary scores, they did not with English vocabulary scores.

Ancillary Findings

As a result of correlating the six variables, a number of findings were obtained which were not previously stated directly in the hypotheses.

The Non-verbal I.Q. scores did correlate significantly with the English vocabulary score, restating the relatively heavy weighting of verbal fluency within overall intelligence (therefore of course including non-verbal intelligence). Although the correlation coefficient between Non-verbal I.Q. scores and the Hebrew vocabulary scores was significant employing a one-tailed t test, the probability was slightly above the significance level of .05 ($p = 0.077$). It then follows that Non-verbal I.Q. scores did not significantly correlate with the degree of bilingualism scores since Hebrew fluency is the major component of the degree of bilingualism score ($r = .898$, $p = 0.000$). The English vocabulary was not found to be a vital factor in the degree of bilingualism ($r = -0.001$,

p = .995), but instead was just employed in the computation of the predicted Hebrew score.

CHAPTER V

SUMMARY, CONCLUSIONS AND DISCUSSION

The purpose of this study was to determine the effect of bilingualism upon cognition using a sample of grade five and six students at The Edmonton Talmud Torah. The subjects were actually pseudobilinguals that is, they learned Hebrew half days as a second language and were more proficient in English. Therefore, it was hypothesized that the "more bilingual" the subject, the more highly he would score on a test of cognition.

Bilingualism was measured using vocabularies in each of the respective languages, and the test of cognition (specifically, participative cognition) was The Portrait Sensitivity Test. It was also important to determine whether or not intelligence was affecting cognition or if it was a concomitant factor. Therefore, the subjects' scores on The Lorge Thorndike Scale were used as a measure of verbal and non-verbal intelligence. The most critical variable was that of "degree of bilingualism" which was computed by attaining the error of estimate between the predicted and actual Hebrew vocabulary scores. These variables (i.e. verbal and non-verbal I.Q. scores, English vocabulary score, Hebrew vocabulary score, score on The Portrait Sensitivity Test and degree of bilingualism) were then correlated using the Pearson product-moment correlation coefficient.

Results of the statistical analysis were presented in Chapter IV and will herein be discussed separately for each hypothesis.

Conclusion I

The subjects' degree of bilingualism did positively and significantly correlate with their level of participative cognition as measured by The Portrait Sensitivity Test.

The more proficient pseudobilingual reacted to an emotional response and, more importantly, related that response to a verbal descriptor to a greater degree than could the less proficient pseudobilingual. The recognition and labelling of an emotion is an abstract, conceptual experience which seems to be an easier task for bilinguals and may be due to their wider vocabulary base and double referent language system leading inevitably to conceptual rather than concrete thought. Simply stated, because bilinguals learn two or more words for each "item" in their world, they are not restricted to a word-object reference system. Ianco-Worrall (1972) had reported that bilinguals were precocious in realizing that names are arbitrarily assigned. Therefore, the bilinguals reach a state of abstraction before their unilingual counterparts. Schutzengel (1974) added that bilinguals display faster developing concept formation because of their experience in transferring concepts back and forth. These advanced levels of concept formation lead to abstraction and an ability to explain underlying motives. She and Ben-Zeev (1977) agreed that bilinguals displayed cognitive superiority and sensitivity to affective cues, particularly where the behavior of others is concerned. Genesee, Tucker and Lambert (1975) had also reported on improved sensitivity, stating that the bilinguals' ability to empathize evolved from a reduced level of egocentrism. These factors, improved cognition and sensitivity, were supported by this study and, in the writer's opinion, form the basis for the two-fold importance of pro-bilingual studies. The first is the educational implication and the second is the sociological one. Both of these issues will be presented later in this chapter.

This important finding of bilingualism significantly correlating with cognition directly supported the work of Bain (1973) upon whose

research the present study was partially based. He summarized the bilinguals' superior performance by stating that,

> Performance on the Portrait Sensitivity Test demands that the individual participate in certain emotional expressions to feel the way that expression feels. He must be able to recognize what his own feelings are, and what feeling is being expressed in the portrait. He must be able to pull the "right" feeling out of this complex of feelings. It seems that the more complexly organized language system of the bilingual is more able to do so accurately. It seems that the bilingual is better able to use his kind of symbolic background to separate out one kind of an emotional experience from another (p. 126).

The type of cognition measured by The Portrait Sensitivity Test has been termed participative cognition. That means that the subjects must perceive the emotion portrayed and identify them without necessarily becoming emotionally involved themselves. However, although the task is cognitive in nature (i.e. perceiving, identifying internally and labelling), the cognition and emotion are not mutually exclusive. When subjects label an emotion such as happiness, it is impossible to imagine that they do not in some way relate it to their past personal experiences of happiness. That then becomes a different experience from labelling nonmeaningful objects. Therefore, the nature of the task also relates to the two major focal points of this study -- improved cognition and sensitivity.

Although the subjects in this study were not fully bilingual, partial acquisition of the second language did not prove to be confusing to them. Instead, even the amount of second language knowledge they did have had a positive effect on their cognitive skills. It is assumed that fully bilingual subjects would attain even higher scores than their pseudobilingual counterparts on the test of participative cognition.

This assumption is made on the basis of the literature review wherein the consensus was that once someone was bilingual enough to avoid confusion, he/she could then truly begin to reap the cognitive benefits of knowing two languages. This is known as Cummins' (1976) threshold theory of second language acquisition. It is important to note that it is impossible to measure when one reaches this threshold. It varies with the amount of time spent with the second language and the type of cognitive operations one must express via the second language. Therefore, the more bilingual the subjects, the more likelihood that they have passed the threshold. In the present study, it may be that the more proficient subjects probably had passed the threshold whereas the least proficient ones perhaps had not.

Conclusion II

The Verbal and Non-verbal I.Q. scores (as measured by The Lorge-Thorndike Scale) did not correlate significantly with results of The Portrait Sensitivity Test. A similar finding had been previously reported by Gates (1925, 1926), Kanner (1931, cited by Jenness, 1932), and Jenness (1930, cited by Jenness, 1932). The verbal I.Q. correlated more closely to The Portrait Sensitivity Test than did the non-verbal I.Q. ($r = .204$ compared to $r = .021$), presumably because verbal I.Q. taps some linguistic skills which are necessary for participative cognition. Despite the role of non-verbal I.Q. in "g" or the general intelligence factor, this particular cognitive task evidently required more of a language factor than is present in tasks subsumed under non-verbal I.Q.

Because of the small sample size, it was impossible to match the subjects for intelligence. Therefore, it was vital to determine if intelligence was a factor in influencing the cognition score. According

to the present results, intelligence was not a significant factor, leaving one to conclude that the effect of the degree of bilingualism upon participative cognition was not significantly related to general intelligence (as measured by the Lorge-Thorndike). A similar conclusion was reached by Hoosain, Atai and Salili (1975) who stated that it was the "bilingual experience" rather than intelligence which was the significant factor in the superior performance of their bilingual subjects. Also, Fishman (1965) explained that if people of similar class and bilinguality are studied ". . . no substantial correlation between bilingualism and intelligence is possible (p. 236)."

Conclusion III

The subjects' verbal I.Q. scores as measured by The Lorge-Thorndike correlated significantly with their scores on the vocabulary subtest of The Stanford-Binet Intelligence Scale.

The reason this hypothesis was important was for substantiation of the vocabulary subtest as an adequate indicator of the overall verbal skill level of the child. Because it correlated positively with an overall intelligence test aside from The Stanford-Binet, it could be deemed appropriate as a measure of verbal skill in the English language. Its structure also provided a model for construction of a Hebrew vocabulary test.

Conclusion IV

Scores on the Moss Hebrew Vocabulary Test correlated significantly with scores on The Lorge-Thorndike verbal I.Q. scale. The correlation was of even greater significance than that between The Lorge-Thorndike and The Stanford-Binet vocabulary. Despite the fact that an English test was being correlated with a Hebrew one, it could be concluded that the Hebrew vocabulary used in this study measured a verbal skill which

is a significant component in the makeup of verbal intelligence. It was further assumed that the Hebrew vocabulary would be a good indicator of intellectual and academic (in Hebrew) achievement for children this age as is the vocabulary subtest of the Stanford-Binet Intelligence Scale. Support is lent to this by the highly significant ($p = .006$) correlation between the English and Hebrew vocabularies.

The positive correlation between the Hebrew vocabulary and verbal I.Q. lends support to the use of The Moss Hebrew Vocabulary Test as an adequate measure of verbal fluency in that language.

Conclusion V

The Portrait Sensitivity Test did not significantly correlate with the vocabulary subtest of The Stanford-Binet Intelligence Scale. Because Lorge-Thorndike I.Q. scores had not correlated significantly with The Portrait Sensitivity Test, it made sense that a major component of intelligence, vocabulary, produced similar results. The importance of this conclusion is that intelligence or verbal fluency in one language were not significant factors to the results of the test of participative cognition. A criticism of early studies was that they did not account for the intelligence factor or did not control for it when matching groups. In the present study a double check has been done (i.e. using both I.Q. and the vocabulary subtest) so that the idea of improved cognition resulting from intelligence could be positively ruled out.

Conclusion VI

Scores on The Portrait Sensitivity Test did correlate positively and significantly with scores on The Moss Hebrew Vocabulary Test. The explanation of this result was somewhat difficult. It has already been indicated that both the English and Hebrew vocabularies correlated significantly with verbal I.Q. It was subsequently found that the

English vocabulary did not correlate significantly with The Portrait Sensitivity Test. The conclusion drawn was that intelligence (and its major component, vocabulary) was not the most significant factor in a test of participative cognition. However, results of Hypothesis VI positively correlated the Hebrew scores with scores on The Portrait Sensitivity Test. Nothing was found in the literature to lead one to the conclusion that something intrinsic in the Hebrew language would affect participative cognition more than would the English language. It was therefore assumed that it is this partial knowledge of a second language (rather than knowledge of Hebrew per se) which is the most important component in this correlation. A similar conclusion was reported by Hoosain, Atai and Salili (1975). As a result of their study of Persian-English bilingual schoolchildren in Iran, they stated that it was the presence or absence of the bilingual experience rather than mastery of the second language which resulted in differences in performance skills between their bilingual and monolingual groups. Orvik (1976) added that it was the interlanguage experience rather than the structure of the language which enhanced cognition. This finding then related well to Hypothesis I wherein a significant positive correlation was obtained between the degree of bilingualism and participative cognition.

In summary, the most critical conclusion of this study was that participative cognition did positively and significantly correlate with the degree of bilingualism of the subjects. Important too was the finding that intelligence did not significantly correlate with cognition, thus ruling it out as a major factor. Both the Stanford-Binet vocabulary subtest and the Moss Hebrew Vocabulary Test were confirmed as appropriate measures of verbal fluency in the respective languages and as being significant components of general intelligence. Although the

Stanford-Binet vocabulary subtest did not correlate with participative cognition, the Hebrew vocabulary did. This finding led to a hypothesis of the second language experience rather than the Hebrew language in itself influencing cognition.

In the writer's opinion the importance of this study lies not only in the educational arena but in the socio-political one as well. On a purely educational level it is critical to note that the subjects who were more bilingual exhibited improved cognition. Many people have feared that the extra "load" of learning a second language would hamper the child both cognitively and academically. The present study and others before it (e.g. Ben Zeev, 1977; Bain, 1974) disprove the cognitive deficit theory and results from research, such as the St. Lambert project, have indicated that bilingual students do as well as or better than monolinguals in native language skills and in non-language subjects such as mathematics. On a local level, a 1978 study of the French immersion program at Laurier Heights School (Edmonton, Alberta) produced similar findings to the St. Lambert project. It seems that skeptical legislators, educators and parents require clear results rather than vague promises that a bilingual program (be it immersion, half time or taught as a subject) is of benefit to the students.

The next logical issue then becomes one of questioning the need for a bilingual program (despite the aforementioned benefits) when the children may not use the second language outside of the school and may certainly never use it in their adult life. Such a question may particularly apply to subjects of the present study who certainly do not encounter much Hebrew outside of the classroom. It appears that the attitude of "if we are not going to use it why learn it?" evolved from people who underwent or were exposed to a "subtractive" situation. The

subtractive situation usually applied to immigrant groups (and unfortunately, in many instances still does) who were pressured to drop their own language in favor of English. Their own language and the learning of a second language in this manner were non-prestigious. Also, there was emotional stress because the home environment often exclusively maintained the second language and the child was torn between two major forces, the home and the school. Given these circumstances, mastery of the second language was often incomplete, leading to cognitive and academic deficits.

In contrast, the present study as well as most of the recent research cited by the writer, pertains to an "additive" situation which involves addition of a socially relevant and accepted language without a negative cost to the native language. The competition between home and school does not exist, with the parents generally supporting the study of a second language. The bilingualism then occurs by choice rather than as a result of external pressures. The subjects in the present study are in an additive situation because their parents have freely decided that learning Hebrew would aid in the maintenance of Jewish culture and perhaps would provide a more stimulating and varied academic environment.

The role of attitude in second language learning is a cyclical one. That is, a positive societal attitude fosters bilingualism and bilingualism promotes a more positive attitude to other cultures and societies. The present study did not directly question the subjects on their attitudes. However, the improved empathy and flexibility of the bilinguals allows them to accept other cultures besides their own as being viable and appealing. For Canada, that has two distinct benefits. Firstly, a bilingual country cannot exist merely by having people learn

the "other" official language. French and English Canada must accept and tolerate the culture and lifestyle of the other. Secondly, a mosaic style of culture can only be maintained if each group supports the existence of the other so that ghetto living is not necessary for retention of one's heritage. That is not to imply that each of us needs to learn the language of every group in Canada. The point is that the openness and breadth provided by bilingualism or multilingualism allows the necessary tolerance and interest to more easily occur. That is also not to belittle the importance of the English language. It is critical both in Canada and internationally and the additive type of situation depicted herein should not in any way detract from our knowledge or need of the English language.

A marvelous example of a supportive environment for bilinguals is occurring at Alex Taylor School in Edmonton. Although English is the language of instruction, the children of the many ethnic groups in that district are encouraged to display their heritage. For example, Chinese New Year's is celebrated by the entire school. Babysitting is provided for parents who want to come in the evenings to learn English. Therefore a supportive environment is arranged whereby maintenance of native culture is encouraged while English is being taught.

The additive environment promotes bilingualism and, more importantly, allows the cognitive benefits of bilingualism to be reaped. Examples of the benefits which have been cited in this study are improved cognitive flexibility (Ben Zeev, 1977), improved divergent thought (Scott, 1973) and acceleration of verbal and non-verbal skills (Peal and Lambert, 1962). The present study specifically emphasized the role of bilingualism in the ability to identify and label emotional expressions.

As mentioned in the Introduction, it is hoped that the results of

this study will be specifically useful to educators at The Edmonton Talmud Torah in evaluating their program. However, another group to whom this study may be of value is that of the many schools who teach second languages, albeit not on an immersion basis. The vast majority of recent studies compare bilingual and monolingual groups. This research has focussed on the pseudobilingual, a definition which probably applies to the majority of second language students in Canada. Therefore, the format of this study may prove useful to those wishing to research similar groups.

Suggestions for Further Research

Some suggestions for future research have arisen as a result of the present study:

1. Future research should include another cognitive measure (in addition to The Portrait Sensitivity Test) so that the influence of bilingualism upon different types of cognition could be researched within the same study. Ideally the second test would test quite a different cognitive skill, such as tasks involving object constancy and naming and use of labels employed by Feldman and Shen (1971). However, the writer stresses the importance of The Portrait Sensitivity Test for such studies because it not only measures cognition but also sensitivity, thus touching upon both the educational and cultural issues.
2. Another method for measuring degree of bilingualism was proposed by Ben-Zeev (1977). She devised a fifteen-item translation test in which sentences to be translated alternated from one language to the other. Any subject failing to translate at least two sentences was eliminated on the grounds of insufficient knowledge in the second language. The sentences were coded as either "plus" or

"minus" according to the language towards which the error was biased and results were then summed. The closer the score was to zero, the more balanced the bilingual was deemed to be. Ben-Zeev also administered an eighteen-word association test with half of the words in each language. A "high balance" score was given if the subject responded in the same language as the stimulus or if responses switched about equally in both directions. Ben-Zeev had criticized sole use of vocabulary for measuring bilingualism because in her opinion vocabularies of bilinguals are somewhat negatively affected by reduced exposure to the two languages. She thought that tests of judgment rather than word production would more adequately assess bilingualism.

However, the writer would suggest that Ben-Zeev's methodology be combined with that of the present study because the vocabularies in this study were not direct translations of each other. This feature allowed for differences in commonality of usage or degree of difficulty which the writer deemed important in a bilingual study. Tests of bilingualism enumerated in Chapter II such as rating scales or tests of fluency could only be employed if the present subjects were to be compared with a matched totally monolingual or fluently bilingual group. If such groups could be found, comparative studies could provide validity for the present research.

3. The subjects in this study were of similar linguistic and cultural backgrounds, making the Lorge-Thorndike Scale a suitable measure of intelligence for them. However, if follow-up research were to include groups of different backgrounds (for instance comparing this group to a Hebrew-English group in Israel), it is recommended that The Raven's Progressive Matrices be used. This test of non-verbal

reasoning was cited by Lambert and Macnamara (1969) as the best measure of intelligence across linguistic and cultural groups.

4. If at all possible, it would be of value to match this group with bilingual and monolingual groups (thus matching for I.Q., age and socioeconomic status). If the present hypothesis holds true, results of the pseudolinguals on test of cognition should be between those of the bilinguals and the unilinguals.

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APPENDIX A

VOCABULARY SUBTEST OF THE

STANFORD-BINET INTELLIGENCE SCALE

(FORM L-M)

VOCABULARY SUBTEST OF THE STANFORD-BINET INTELLIGENCE SCALE (FORM L-M)

1. orange
2. envelope
3. straw
4. puddle
5. tap
6. gown
7. roar
8. eyelash
9. Mars
10. juggler
11. scorch
12. lecture
13. skill
14. brunette
15. muzzle
16. haste
17. peculiarity
18. priceless
19. regard
20. tolerate
21. disproportionate
22. lotus
23. shrewd
24. mosaic
25. stave

26. bewail
27. ochre
28. repose
29. ambergris
30. limpet
31. frustrate
32. flaunt
33. incrustation
34. retroactive
35. philanthropy
36. piscatorial
37. milksop
38. harpy
39. depredation
40. perfunctory
41. achromatic
42. casuistry
43. homunculus
44. sudorific
45. parterre

APPENDIX B

THE MOSS HEBREW VOCABULARY TEST

1.	שיר	מילים ומנגנים; שם של שיר; שירים בקול.
2.	עבודה	מלאכה; שעורים; מקצוע; עבודת בית; קשה; נקיון שלג; עסוק במשהו.
3.	בגד	כל מיני בגדים; לבוש; להתפשט; להוריד; לתפור.
4.	ירח	לבנה; בשמים; בלילה; זורחת; אסטרונות; מסתובב; חדשים,לוח.
5.	עט	לכתוב; דיו; לשמוש בבית ספר; זמן; שעון; שעה.
6.	מסכה	פורים; על הפנים; לסכות את הפנים.
7.	מסאסא	לנקות רצפה מאבק ואשפה; חבילה של שבטים מאגדים יחד.
8.	כדור	גוף עגל; כדור למשחק; כל מיני משחקים כמו כדור רגל; רופא נותן כדור כמו "אספירין".
9.	ספור	הרצאת מעשה; לקרוא ולכתוב.
10.	כסף	לסחור; לקנות; לשלם; צבע כסף; מטבעות וכלים מכסף; עשיר ועני.
11.	דג	חיים במים; כל מיני דגים; אוכלים.
12.	נר	עשוים ספרפין או חלב או שעוה; נרות לשבת או חנוכה; להדליק; אש; נר עם שמן.
13.	ניר	לכתיבה; לציור; מעצים; בשביל ספורים; בבית שמוש.
14.	תנור	לשרוף בו; לאפיה; לבשל; לחמים.
15.	צבע	שם של צבע; רואים צבע בעינים לפי האור.
16.	בית	דירה; מעון; לגור בו; בנין למשפחה; מין בית כמו בית דין.
17.	רכבת	שורת קרונות; על קסר או מסלת ברזל; לנסוע; שורה של משהו.

18. מסעדה — בית-אכל; מגישים בו מעודות; משלמים כסף לאכול.

19. פרה — בקר; חיה; בשר; חלב; במשק.

20. שעון — מורה-שעות; מכשיר המודד על הזמן; שעון-יד; שעות,דקות.

21. תמונה — ציור; דמות; מראה; בספר; על הקיר; להסתכל בו.

22. שלג — תפות מים שקפאו ונופלים על הארץ; מזג אויר קר; בחרף; לבן.

23. חלון — פתח העשוי בקיר בית או בנין לאור ולאויר ולהביט החוצה; זכוכית; פותחים וסוגרים.

24. מכתב — אגרת; אדם שולח למשהו להודיע דברים או לשאול מקבלים; קוראים; כותבים.

25. יער — משח-אדמה גדול שגודלים בו עצים; יש גם חיות.

26. ללעוס — עם שניים; לאכול מסטיק; צריך ללעוס לפני אכילה.

27. סופר — משהו שכותב ספרים; מורה שמלמד קריאה ותורה.

28. לרחוץ — לנקה גוף,פנים,ידים במים; לשטוף; בסבון; במקלחת.

29. ליצן — בדחן; אנשים צוחקים מפניו.

30. חלוץ — חיל בראש המחנה; ראשון לכבוש; עבודים ראשונים בארץ.

31. לצעוק — קול מגרון; קורא בקול גדול; לצעוק מצרה,רגז, כאב.

32. שעור — למודים; בבית ספר או מקצוע; ערך; יחס.

33. שפה — לשון; להשתמש במילים; על הפה; לדבר; שם שפה.

34. יקר — חביב; מחבד; בהתחלת מכתב; בעל ערך רב; הרבה כסף; אבן יקרה.

35. חופשה — חרות; דרור; זמן שלא בעבודה או בית ספר; חופשת קיץ.

36.	להסתכל	צופה; רואה; עם עינים; להסתכל על מסהו; משקיף.
37.	ריק	שאין בתוכו כלום; שהוצא כל מסהיה בו; הפך של מלא.
38.	רגיל	המצאוי לרב; עושים כל הזמן; כמו תמיד.
39.	קל	לא כבד; לא קשה; מהיר; לא גדול; אין לו ערך רב.
40.	צלחת	קערה שטוחה או עמוקה; בשביל אכל,ארוחה; שמים על השלחן.
41.	רשימה	כתב של דברים שונים.
42.	אשפה	זבל; דברים שלא רוצים; פח-אשפה; אשפת-מטבח.
43.	מסבה	קבוצת אנשים לאכול,לרקוד,להסב; מסתה; יום הלדת.
44.	נמל	חוף ים; לעוניות.
45.	כביסה	לרחוץ בגדים במים לנקות אותם.
46.	זקן	שער על הפנים; אצל הגבר.
47.	קולנוע	סרט; אולם של סרט; משלמים לראות סרט.
48.	עסוק	מנהג; עושים דבר.
49.	רזה	בלי שמן.
50.	שבור	פצוע; נשבר; לא ביחד; כשכוס נופל על הרצפה.
51.	מרקחת	בית-מרקחת; בית-מסחר שמוחרים בו רפואות; רבה.
52.	בטן	חלק למטה מן החזה; בשביל האכל; עגולה.
53.	מטבח	חדר בבית שמבשלים ואוכלים בו; שלחן וכסאות; תנור; מקרר.
54.	חפזון	למהר; לרוץ; מיד; כאשר אין זמן.
55.	חיס	תופר בגדים.

56.	מקצוע	מסאיש או אשה עושה לעבודה או לענין; פנה; פרק או פרשה.
57.	נעל	לובשים על הרגל; עור; סנדל; לנעול, לסגור במפתח.
58.	קיץ	חם בחוץ; הרבה שמש; יש פרחים ופרות; תופשה; זמן בשנה; הפך של חרף.
59.	לחזור	ללכת עוד פעם; מכתב חוזר.
60.	אסור	קשור בבית סוהר; אין מותר או רשות.
61.	עוגה	כמו לחם קטן; לאכול; מתוק; אופים עוגות.
62.	חם	ממפרטורה גבוה; הפך של קר; קיץ; תנור.
63.	עתון	כתב-עת; חדשות; קוראים כל יום.
64.	סבא	זקן; אבא של אם או אבא; בעל של סבתא.
65.	ארוחה	סעודה; אוכלים בבקר,צהרים,ערב.
66.	בקבוק	זכוכית; שותים; בקבוק יין או סודה.
67.	מסריה	מפני הגשם; על הראש.
68.	מצוין	מיחד; טוב ביותר; יוצא מן הכלל.
69.	לרוץ	ללכת מהר; במפזון.
70.	סכין	כלי-מטבח; לאכול; לחתך; סכין גלוח.

TRANSLATION OF MOSS HEBREW VOCABULARY TEST

1. song - words with a tune; name of a song; singing with one's voice.

2. work - labour; work in school; occupation; housework; busy with something; prayer; examples of work such as cleaning the snow.

3. clothing - names of all types of clothing such as shirt, dress, etc.; to get dressed, to undress; what one wears.

4. moon - white, in the sky at night, shines; astronauts have gone to the moon; the calendar is based on the moon.

5. pen - use it to write; ink; use it at school. Also means time, clock, hour.

6. mask - wear it on one's face, covers one's face; use it on the holiday of Purim.

7. broom - use it to clean the floor of dust and dirt; straw is tied together at the bottom and there is a long handle.

8. ball - a round object; use it to play with, examples of ball games such as football, baseball; to kick, throw, catch.
Also means pill such as the doctor prescribes, such as "Aspirin".

9. story - a tale (and other synonyms); can tell or read or write a story; tells of a happening or event with a beginning and an ending.

10. money - use for commerce, for buying, for paying; coins or bills; rich when have lots of money;
Also means silver.

11. fish - live in the water; swim; examples of fish; one eats them.

12. candles - made from parafin or wax with a wick; fire; light them; use on Sabbath or Chanukah.

13. paper - for writing or drawing; made from trees.

14. stove - used for cooking, baking, warming; an appliance; have it in the kitchen.

15. colour - names of colours; see colours by means of lights reflected on them.

16. house - dwelling, abode, building; live in it; type of house such as "court house".

17. train - an assembly of railway cars; goes on a track; travel or send things on a train.

18. restaurant - a place to eat; go there for meals; pay money to eat there.

19. cow - animal; cattle; farm animal; gives milk; one eats the meat; description of cow.

20. clock - tells time; uses hours and minutes; watch.

21. picture - drawing or painting; something to look at; picture books; hang it on the wall.

22. snow - drops of water which have frozen and fall to the ground; there is snow in cold weather; white; winter.

23. window - an opening in a wall of a house or building to let in air or light and for looking outside; made of glass; open or close a window.

24. letter - put in an envelope; send someone a letter to let them know something; read or write a letter.

25. forest - a large tract of land wherein trees grow; also animals live in a forest.

26. chew - chew with teeth; chew gum; one must chew before swallowing food.

27. author - someone who writes books; Also someone who teaches bible and reading.

28. wash (self) - to clean one's body, hands, face with water; use soap to wash; wash in the shower or sink.

29. clown - someone who makes people laugh.

30. pioneer - first or early workers of the land.
Also soldier in charge of a camp.

31. shout - to call out in a loud voice such as in anger or pain.

32. lesson - studies; what one learns at school.
Also worth.

33. language - examples of languages such as French, Hebrew; speak a language; made up of words.

34. dear - well liked, pleasant.
Also precious, expensive.

35. vacation - free time; time when one is not at work or school; summer vacation.

36. look at - see; view; look at something with one's eyes.

37. empty - when something has nothing inside of it; opposite of full; whatever was there was removed.

38. regular - something done most of the time; something that usually happens.

39. easy - not difficult, not very important.
Also light - not heavy.

40. plate - flat dish or a bowl; used at meals; put food on a plate; put the plate on the table.

41. list - write down things in order.

42. garbage - waste; garbage can; things you don't want and throw away.

43. party - gathering of people to eat, dance, visit; birthday party.

44. port - on the seashore or lake; place for boats to dock.

45. laundry - to wash clothes with water and soap in order to clean them.

46. beard - hair on the face that a man has.

47. theatre - films; place where they show movies; place to go and pay to see movies.

48. busy - taken up with doing something; occupied.
Also something one customarily does with one's time:

49. thin - skinny; not fat.

50. broken - not whole; in pieces; not working; like when a glass falls to the ground and breaks.

51. drugstore - store where one buys medicines.

52. stomach - part of the body; for digesting food; stomach is "round".

53. kitchen - room in a house where one cooks and eats; fridge and stove are in the kitchen; table and chairs in the kitchen.

54. rush - to hurry, run; when there is not any time to spare; need to do something immediately.

55. tailor - someone who sews clothing.

56. profession - what someone does as their work or interest; usually that is how people earn money; examples of professions such as carpenter, lawyer.

57. shoe - wear on one's foot; usually made of leather; sandal, etc.
Also means to lock.

58. summer - season; when it's warm outside, lots of sunshine, flowers, fruit, etc.; on vacation from school; opposite of winter.

59. return - to go back again; to circulate

60. forbidden - not allowed; no permission to do something.
Also imprisoned.

61. cake - like a small sweet bread; to eat; bake cakes.

62. hot - high temperature such as a hot stove; hot weather in summer; opposite of cold.

63. newspaper - read it every day; tells the news; printed.

64. grandfather - father of one's father or mother; an older man; grandmother's husband.

65. meal - food that we eat morning, noon, and evening; breakfast, lunch, supper.

66. bottle - made of glass; holds something to drink such as wine or pop.

67. umbrella - hold it over one's head to keep the rain off.

68. excellent - very, very good; special; out of the ordinary.

69. run - to go quickly by foot.

70. knife - cutlery; cut with a knife; used for eating; handle and blade.
Also razor.

Note: The awkwardness of some of the translations is due to the differences between the languages. As noted, some of the words in Hebrew have two meanings which are totally unrelated in English.

APPENDIX C

THE PORTRAIT SENSITIVITY TEST

PORTRAIT SENSITIVITY TEST ITEMS AND CORRECT CATEGORIZATIONS

Item	Catalogue Number	Title of Portrait and Name of Artist	Category of Emotion
1	B353	Il Condottiere - Antonello da Messin C1430-1479	A
2	C349	Padre Servito Grand (Detail of Feast of St. Gregory) - Veronese 1528-1588	F
3	D68	Portrait of a Man with Rosary - Gossaert (Mabuse) c 1478-1535	S
4	D153	Galileo - Suttermans 1597-1681	S
5	D191	Portrait of a Lady - Van Miereveld 1567-1641	A
6	D196	Portrait of a Man - Hals 1580?-1666	L
7	D201	La Bohemienne - Hals 1580-1666	L
8	D262	Titus - Rembrandt van Rijn 1606-1669	L
9	D265	Portrait of the Artist - Rembrandt van Rijn 1606-1669	A
10	D282	Paul Potter - Van der Helst 1613-1670	C
11	D390	Portrait of Durer's Father - Durer, 1471-1528	F
12	D411	Hans Imhoff - Durer 1471-1528	A
13	D444	Portrait of a Man - Amberger 1500-1561	F
14	E3	Francis I - Jean Clouet Act. 1516-1540	C
15	E13	The Viscount de Turenne - Champaigne 1602-1674	C
16	E45	Self Portrait, Pastel 1751- Maurice Quentin de la Tour 1704-1788	L

Item	Catalogue Number	Title of Portrait and Name of Artist	Category of Emotion
17	E245	Dona Isabel Cobos de Porcel 1806. Goya, 1746-1828	L
18	E264	Louis Guillaume - Cezanne, 1839-1906	F
19	F84	Mrs. Siddons - Lawrence 1769-1830	F
20	H219	Lilya - Speicher 1883 -	C
21	H270	Portrait of Mrs. Edith Mahon - Eakins, 1844-1916	F
22	MH14	Ann Pollard - Unknown Limner C-1721	F
23	P35	Portrait of the Artist - Rembrandt van Rijn, 1606-1669	C
24	P168	The Girl with a Red Hat - Vermeer, 1632-1675	S

PORTRAITS

Name _____ Age _____

EMOTION

PORTRAITS	LOVE	SURPRISE	CONTEMPT	FEAR	ANGER
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

APPENDIX D

LORGE-THORNDIKE INTELLIGENCE TEST SCORES

LORGE-THORNDIKE INTELLIGENCE TEST SCORES

SUBJECT	VERBAL IQ	NONVERBAL IQ
01	134	126
02	100	102
03	133	129
04	95	114
05	97	79
06	131	132
07	109	138
08	91	80
09	106	118
10	105	87
11	117	118
12	118	98
13	113	118
14	133	147
15	121	121
16	102	82
17	124	142
18	95	79
19	116	121
20	103	110
21	105	85
22	129	128
23	131	139
24	110	126
25	97	99

SUBJECT	VERBAL IQ	NONVERBAL IQ
26	123	122
27	103	105
28	135	130
29	92	121
30	110	109
31	109	125
32	105	125
33	103	107
34	114	119
35	105	92
36	125	111
37	100	100
38	103	102

APPENDIX E

THE STANFORD-BINET INTELLIGENCE SCALE

VOCABULARY SUBTEST SCORES

THE STANFORD-BINET INTELLIGENCE SCALE

VOCABULARY SUBTEST SCORES

SUBJECT	RAW SCORE
01	19
02	13
03	21
04	10
05	8
06	13
07	14
08	8
09	11
10	9
11	13
12	11
13	14
14	13
15	13
16	10
17	10
18	11
19	11
20	13
21	18
22	21
23	21
24	13

SUBJECT	RAW SCORE
25	17
26	17
27	16
28	20
29	10
30	11
31	20
32	18
33	18
34	20
35	21
36	15
37	17
38	8

APPENDIX F

THE MOSS HEBREW VOCABULARY TEST SCORES

THE MOSS HEBREW VOCABULARY TEST SCORES

SUBJECT	RAW SCORE
01	41
02	14
03	40
04	15
05	34
06	33
07	04
08	01
09	23
10	23
11	06
12	33
13	36
14	43
15	26
16	26
17	39
18	07
19	34
20	37
21	41
22	46
23	41
24	44
25	42

SUBJECT	RAW SCORE
26	28
27	48
28	55
29	24
30	39
31	16
32	40
33	27
34	35
35	32
36	39
37	37
38	29

APPENDIX G

THE PORTRAIT SENSITIVITY TEST SCORES

THE PORTRAIT SENSITIVITY TEST SCORES

SUBJECT	SCORE
01	15
02	12
03	07
04	06
05	10
06	10
07	05
08	07
09	08
10	08
11	07
12	07
13	07
14	10
15	04
16	10
17	09
18	06
19	12
20	12
21	10
22	12
23	07
24	09
25	09

SUBJECT	SCORE
26	13
27	10
28	10
29	10
30	09
31	07
32	08
33	10
34	10
35	10
36	11
37	07
38	11